

TABLE 1. *Vehicle fatalities by type of accident in U. S. Navy and Marine Corps personnel, 1952 through 1954*

Type of vehicle	Driver or passenger	Vehicle not in accident, Man fell off	Vehicle in accident				Location		
			No rollover		Rollover		U. S.	Overseas	
			Stayed in	Thrown out	Pinned down	Thrown out			Korean
<b>OPEN TOP</b>									
Jeep	Driver Passenger Passenger		1	2	5 <sup>b</sup> 1 4	4 <sup>a</sup> 3 1	2 2 1	3 3 2	4 3 2
Weapons carrier Heavy 6 by 6 truck	Driver Passenger Passenger	3		2	8 <sup>c</sup> 6 <sup>c</sup> 1		3 1 1	4 4 6	1 1 2
DUKW (duck) Caterpillar	Driver Passenger Driver	3					1	1	2
<b>HARO TOP</b>									
Fire or crash truck	Driver Passenger Passenger	6 1			1 <sup>e</sup>	2	2 4 1	1	2
Gasoline truck Ambulance Pickup truck	Driver Driver Pass. (front) Pass. (rear)		1 1 1 <sup>e</sup>	3 1 2 <sup>d</sup>		2 <sup>d</sup> 1 2 <sup>d</sup>	1 1 2 3	1	1 1
Carryall or panel truck Dump truck	Driver Passenger Driver Passenger	1					2		
Total		14	7	10	26	15	32	22	18

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- a. In one fatal accident, a passenger was thrown out and escaped with apinal injuries.
  - b. Jeep, rolled over, killing passenger; driver was thrown out and escaped injury.
  - c. In one fatal accident, eight other passengers in back escaped injury.
  - d. In one fatal accident of each type, others in vehicle who were not thrown out were only slightly injured.
  - e. Drowned when vehicle ran off pier or turned over in shallow water.
- 

Two vehicular deaths not tabulated occurred on aircraft carriers at sea. In each of these, an aircraft towing truck fell into an elevator well, the driver falling first and the truck on top of him. They are not included in the tabulation, as speed and design of this vehicle would not seem to call for use of seat belts.

those same 33 persons would have been killed had they been kept in the vehicle by seat belts, although in a number of instances they actually were thrown out before being pinned down or rolled on.

On the other hand, in 13 of the 20 deaths in accidents of panel and pickup trucks, cerryalls, and other hard-top vehicles, the chances that a seat belt would have prevented the fatality appear to have been very good. In 12 cases the victim was thrown out of the cab or enclosed part of the vehicle; however, in one of these he was probably too drunk to have used a belt, leaving 11 who might have been saved. In four of the accidents the victim was fatally injured while remaining in the cab; however, in one case he was crushed by the steering wheel and in another he probably was too drunk to have used a belt, leaving 2 more who might have been saved. In three deaths the victim was drowned when the vehicle turned over into a rice paddy or plunged off a pier; and the remaining man killed was sitting on the rear of a pickup truck and was thrown out.

In the one ambulance accident involving a fatality, not only was the driver killed but also the passenger (a medical officer) was thrown about and critically injured. Considering that in 1950 another medical officer was killed in a Navy ambulance collision by being thrown from the right front seat, it would seem especially important to provide safety belt protection for the passenger on the front seat of a standard ambulance.

There were 14 deaths caused by falls from vehicles not involved in accidents. Seven of the victims were killed by falling from fire, crash, or gasoline trucks; usually when the truck was making a sharp turn. Two of these were passengers seated in the cab, and five were men standing on the truck, who lost their grip on a turn or while changing position. The two seated passengers certainly would have been saved by seat belts. It also would appear warranted to consider the use of quick-release belts to hold standees in place on certain types of fire and crash vehicles. Four of the 14 victims fell off the rear end or side rail of 6 by 6





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trucks or dump trucks, and three died from falling between the frame and treads of caterpillars.

If seat belts had been installed in hard-top vehicles only, and if men had been successfully indoctrinated in using them (which will take considerable time and effort and never be fully achieved), a saving of 15 lives is the maximum benefit that could have been expected on mortality alone. If all these deaths had been prevented, the monetary saving would have amounted to over \$470,000. This is only the beginning of savings possible, as many grave and costly injuries would at the same time have been prevented or converted to minor ones.

The lack of adequate data in many reports of death is a serious handicap in estimating the value of preventive measures, either potential or realized. Even more sketchy is the data on injuries which are survived. The latter are far more frequent and often much more costly in time, medical manpower, and money, than deaths. Data of immense value for planning and for subsequent evaluation could be obtained if more detailed information were required on all automobile injuries involving more than a few sick days. A minimum of 5 or 10 days might be specified so as to keep the burden of reporting within reason. The causative vehicle, the method in which injury was sustained, the presence or applicability of safety devices, all need a statistical evaluation.

### SUMMARY

Deaths of Navy and Marine Corps personnel in government-owned ground vehicles are analyzed for a three-year period. More than half of these (41 out of 72) occurred in open-top military type vehicles, a higher proportion than would be expected during peacetime. Provision of seat belts in open-top vehicles would probably not have reduced but would more likely have increased these fatalities. In only five deaths did this type of vehicle remain upright when involved in an accident, whereas in 33 it rolled over. By comparison, 10 persons who escaped death in rollover accidents by being thrown out would probably have been killed if they had been kept in by seat belts.

In hard-top vehicles involved in accidents, 15 of 20 deaths would probably have been prevented if the victim had been wearing a seat belt, although in two cases he was too drunk to have used one. In 12 of the deaths, the victim was thrown from the cab, with or without rollover. Front seat passengers in ambulances appear to be especially at risk when not provided with seat belts.

Seven deaths, or one out of 10, occurred in falls from fire and crash trucks when the vehicle was merely making a turn. In two of these, the man slid off a seat. In these two cases, seat belts

would certainly have prevented the accidents had they been worn. Quick-release bolts for standees should also be considered for this type of vehicle.

If seat bolts are used in hard-top vehicles, potential monetary savings on deaths alone amount to \$470,000 in three years. In addition, many serious and costly injuries would be prevented.

Weighing the cost of preventive measures against their savings, both in deaths and in the far more frequent nonfatal but costly injuries, requires more detailed reporting of the causes of trauma in serious and fatal vehicular accidents.

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#### THE NAVY — 1957

"The Navy will add six warships and five other vessels to the fleet during fiscal '57, but manpower will be decreased.

"Slated to end fiscal '56 on 30 June with 405 warships, the Navy has won Administration approval for 411 warships a year later and for 594 other ships—a total of 1105, compared with 944 planned for the end of the present fiscal year.

"The Navy will have the same number of carrier air groups, 17, and carrier anti-submarine squadrons, 31, at the start and end of fiscal '57.

"On the personnel side, newly announced plans will show the Navy beginning the year of 1 July with 662,744 officers and men, and ending the 12 month-period with 662,175.

"At the end of fiscal '57, the Navy foresees a strength level of 72,800 officers and 584,200 enlisted men, identical figures with those at the beginning of the year."

—HAROLD HELFER,  
in *Our Navy*, p. 16, Mar. 1956

## MINOR REFRACTIVE ERRORS VERSUS DEPTH PERCEPTION

BUTHER L. NEWMAN, *Lieutenant (junior grade), MSC, USN*

GOOD DEPTH perception is important to everyone, but as was pointed out when the visual screening profiles of a group of Overhaul and Repair Department inspectors at this air station were being reviewed, some who are in technical trades and professions need to excel in this particular visual skill. Because screening on depth perception was included in the routine checks along with far and near point acuity, far and near point muscle balance, and color perception, some interesting data were compiled. This is especially true of the findings on 17 men who initially failed the depth perception screening, but who passed on a second trial, after having been refracted and given a lens prescription (table 1). These data substantiate the opinion that refractive error and bad depth perception go hand in hand.

In the phenomenon of depth perception, many factors are combined before a final estimation of depth is accomplished. Although the time element involved in making an estimation is only a split second, a combined reaction to various stimuli has taken place in the observer's nervous system. For purposes of discussion, these stimuli can be called factors, and the factors classified as adjunctive (depending on the relative comparison of one outside object to another) and basic (depending solely on the observer's perception apparatus and the object under estimation). Adjunctive factors are: comparison of retinal image sizes of two familiar objects; motion parallax (*i. e.*, the apparent motion of objects within the visual field surrounding the object of fixation that is caused by movement on the part of the observer); linear perspective; and familiarity with the effects of atmospheric conditions on the appearance of distant objects. This last factor might be referred to as aerial image. Add to this the factor of accommodation (or range of focusing), and you have a fairly complete list of adjunctive factors affecting depth perception that are available to either one- or two-eyed individuals.

Since the best depth perception depends on factors which are available only to persons with binocular vision, and since this

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From U. S. Naval Air Station, San Diego, Calif. Lt. Newman is now assigned to U. S. Naval Hospital, Navy 3923, FPO, San Francisco, Calif.

TABLE 1. Depth scores in 17 subjects before and after application of lens prescriptions

Case number	Age	Unaided visual acuity		Initial depth score*	Lens prescription			Rescreening depth score
		Right	Left		Sphere	Cylinder	Axis	
1	33	20/20	20/20 <sup>-1</sup>	0	R -0.25 L -0.50	+0.50 +0.75	180 180	8
2	34	20/20 <sup>-1</sup>	20/20	2	R -0.25 L -0.50	+0.75 +0.50	90 90	7
3	42	20/20	20/40	2	R -0.50 L -1.00	+0.50 +1.00	180 180	6
4	31	20/20	20/20	1	R -0.50 L Plano	+0.50 —	55 —	7
5	48	20/20	20/20	1	R +0.25 L +0.25	— —	— —	4
6	38	20/20	20/20	0	R +0.25 L Plano	— +0.50	— 180	4
7	35	20/20	20/20 <sup>-2</sup>	0	R Plano L -0.75	— +0.50	— 180	4
8	40	20/20	20/20	0	R -0.50 L -0.25	+0.50 +0.75	180 180	5
9	46	20/20	20/20	1	R +0.50 L +0.50	— —	— —	7

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Case number	Age	Unaided visual acuity		Initial depth score*	Lens prescription			Reacquiring depth score
		Right	Left		Sphere	Cylinder	Axis	
10	44	20/20	20/20	2	R Plano L Plano	+0.75 +0.75	95 85	6
11	37	20/20	20/20	2	R Plano L Plano	— +0.50	— 90	6
12	42	20/20	20/20 <sup>-2</sup>	1	R +0.25 L +0.75	— —	— —	5
13	31	20/20	20/20	0	R +1.00 L +1.00	— —	— —	5
14	37	20/20	20/20	1	R Plano L Plano	+0.50 +0.25	180 180	5
15	29	20/20	20/20	0	R Plano L Plano	+0.50 +0.50	180 180	6
16	37	20/20 <sup>-1</sup>	20/20 <sup>-1</sup>	0	R -0.50 L -0.50	+0.75 +0.75	55 125	6
17	41	20/20 <sup>-1</sup>	20/20	0	R +0.50 L Plano	— —	— —	5

\*Depth scores based on the Bausch & Lomb Optical Company system as applied to their ortho-rater screening instrument.

Maximum score possible: 9

Minimum passing scores: 4

article is wholly concerned with binocular subjects, let us consider what takes place in the case of such an observer who is hampered in estimating depth by some slight anomaly in the form of a minor refractive error in one or both eyes. The foremost factor in making a depth estimate that is affected by a refractive error is binocular parallax, by means of which the two eyes working in a binocular pattern can discern the movement of an object either toward or away from the object of fixation. This is possible because binocular subjects have available to their perception apparatus overlapping retinal fields, semidecussation of optic nerve fibers, corresponding points, and conjugate movements of the eyes. Unless visual acuity is approximately equal in the two eyes, the foregoing physiologic factors will not be nearly so effective in helping to make accurate depth estimates. Just what physiochemical, neurophysiologic, or gross anatomic changes are responsible for the phenomena that refractionists call refractive errors is still open for research, but since this article is reporting only the effects of refractive errors on depth perception, I will not attempt further discussion of the physiologic processes involved.

Of about 400 inspectors examined, 17 men ranging from 29 to 48 years of age were found to have substandard depth perception; yet their failing of the depth test on routine visual screening was the first intimation that anything was amiss in their visual apparatus. None would admit to having any subjective complaint with respect to visual acuity or visual discomfort. The fact that these 17 men would be able to pass every other screening test, so long as depth perception was not checked, points up the extreme desirability of including such a test in the routine visual screening of any age or occupational group. Were it not for their having failed on the depth check, these men would not have attained the increased visual efficiency which their subsequent lens prescription afforded them.

These 17 men were not the only ones whose scores on depth screening were below the standard set for Overhaul and Repair inspectors, but they were the only ones of these who had no objective or subjective sign of any visual defect other than faulty depth perception. That the percentage of the entire group examined who failed their depth screening was low was because even prior to the inclusion of the depth check in the screening routine, the men were periodically rescreened every six months, and appropriate changes were made in their lens prescriptions. Therefore, each could be considered to be at his peak efficiency insofar as visual acuity was concerned.

All but one of the 17 men had unaided monocular visual acuity of 20/20, the single exception having 20/20 O.D. and 20/40 O.S. There seemed to be no relationship among the 17 in regard to



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All but one of the 17 men had unaided monocular visual acuity of 20/20, the single exception having 20/20 O.D. and 20/40 O.S. There seemed to be no relationship among the 17 in regard to

the type of refractive correction needed, except that none were myopic. Some had simple hyperopia; others had variable types of astigmatism. One of the group required a short period of supervised orthoptics, in addition to his lens correction, to remedy a moderate amount of excessive exophoria. Upon rescreening after this treatment, he was able to pass the depth check. Age did not seem to have any significant relationship to failure on the depth check. The average age was 38 years only because there is little turnover in personnel among this particular group, with the natural consequence that the same group tends to be on the same job for a number of years.

### SUMMARY AND CONCLUSIONS

The visual skill of depth perception can hardly be overstressed, and it is of paramount importance to include a depth check in any visual screening routine. Otherwise, the screening cannot be considered all-inclusive for evaluation purposes. This is illustrated by the finding of 17 men, among about 400 examined, who would be considered acceptable in any visual screening check were it not for their inability to exhibit a passable performance in depth perception. It appears important in the light of this experience that refractionists give careful consideration to any refractive error, no matter how small, as being a potential factor in causing a substantial decrease in visual efficiency.

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### GLAUCOMA PREVALENCE

"The National Society for the Prevention of Blindness estimates that approximately one million Americans have undiagnosed chronic simple glaucoma and states that every general practitioner should assume that one in 50 of his patients who are over 40 years of age probably has this disease." Early detection and treatment result in a favorable prognosis.

—EDITORIAL

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## Malignant Palatal Lymphoma Involving the Periodontium

JAMES E. CHIPPS, *Lieutenant Colonel, DC, USA*

C. JULES ROMINGER, *M. D.*

WILLIAM D. STANCUTT, *M. D.*

**T**HE radiosensitivity of localized lesions in malignant lymphoma is well known. However, if there has been spread of the lesion to adjacent structures, usually some distant metastasis also exists and the benefits of local therapy are but short-lived.

The following case is of interest because the local involvement was marked, but there is no evidence of generalized disease or local recurrence 2½ years after irradiation therapy.

### CASE REPORT

A 26-year-old man was returned from overseas with an ulcerating tumor of the oronasal structures, centering in the palate, which had been diagnosed as malignant lymphoma by biopsy.

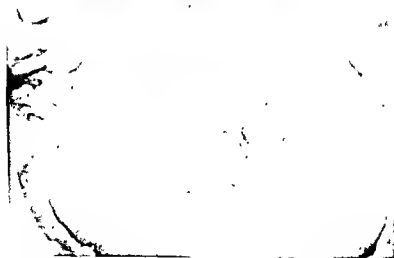
**History.** Frequent episodes of acute nasal obstruction and sinusitis had occurred since the patient was 12 years old. There had been a sudden onset of left-sided earache and tinnitus 10 months before admission. The maxillary sinuses had been irrigated three months before, producing much purulent, foul-smelling material. Shortly afterwards, pain and swelling began in the roof of the mouth, and an ulcer appeared in the soft palate. The patient was hospitalized and treated with antibiotics. The swelling and ulcer continued to enlarge, and biopsies were obtained on separate occasions from the margin of the ulcer, the nasopharynx, and the tip of the inferior turbinate. Pending the results of the biopsies, cortisone and corticotropin (ACTH) were employed but without effect. A report of malignant lymphoma was obtained, and the patient was transferred from the overseas hospital to the zone of interior.

The transfer was completed on 5 October 1953. In the preceding few days, the patient had noted a rapid increase in the size of the ulcer, the swelling of the soft palate, and symptoms of nasal obstruction. In the preceding three months, there had been a 25-lb weight loss, which he attributed to an inability to masticate and a loss of appetite because of the foul-smelling oral ulcer.

The patient appeared chronically ill. A tumor mass of the nasopharynx and partially occluded the oropharynx so inspiration by mouth was slightly labored. The tumor mass measured approximately 9 by 5 cm, and a central area of ulceration measured by 2 cm. The lesion involved the entire hard and soft palate (figs. 1 and 2). The uvula was enlarged to twice its normal size. There was



*Figure 1. Anterior portion of ulcerative lesion, hard palate.*



*Figure 2. Posterior portion of ulcerative lesion, soft palate and oral pharynx.*

tumorous extension to the left tonsil and the upper pole of the right tonsil. A communication through the necrotic ulcer between the mouth and the floor of the right nasal cavity could be demonstrated by probe. All maxillary teeth were slightly mobile, although the marginal gingivae were at normal levels and the epithelial attachments had not receded. Nodes were palpable and tender deep to the mandibular angles bilaterally.

Radiographs showed destruction of the medial portion of the hard palate, opacity of the maxillary sinuses, and a polyp in the right frontal sinus.

Radiographs of the chest were normal, and the rest of the physical examination was not significant.

**Treatment.** The patient was presented to the hospital's tumor board. Irradiation therapy after extraction of the maxillary teeth was recommended.

Under general anesthesia on 6 October, a biopsy specimen was obtained from the edge of the palatal ulcer, and the dental extractions were accomplished. Although no attempt was made to include surrounding blocks of the maxillary bone in the routine forceps removal of the teeth, spongy white material which contained bony spicules clung to the apical half of each tooth as it was removed. An alveolectomy sufficiently extensive to permit approximation of the mucoperiosteal edges across the sockets was performed as a protective measure against the effects of irradiation.

Microscopically, the biopsy specimen from the palate (fig. 3) showed masses of atypical lymphocytes within the intratrabecular areas of cancellous bone. These lymphocytes presented a monotonous uniformity. There were no giant reticulo-endothelial cells. There was erosion of bone. A few fat cells were seen, but most of the fatty tissue was obliterated by the infiltrating tumor cells. A diagnosis of lymphosarcoma was made.

One of the extracted teeth with attached tissue was decalcified and sectioned. There was a diffuse infiltration of atypical lymphocytes in the tissue adjacent to the tooth root (fig. 4). Fragments of alveolar bone showed compression and erosion. Erosion of the cementum was seen in one area.

Irradiation therapy was accomplished between 7 October and 18 November, using the following factors: 200 kv, 20 ma, 50 cm target skin distance, Thoraeus filter half-value layer 1.95 mm Cu. Multiple portals were employed which encompassed the entire nasopharynx, all of the paranasal sinuses, and the lymph nodes in the upper cervical regions (fig. 5). A tumor dose of 3,000 roentgens was administered to all of these regions. Following this, additional treatment was delivered to residual tumor in the palate using a peroral lead cone and the following factors: 200 kv, 20 ma, 40 cm target skin distance, 0.5 mm plus

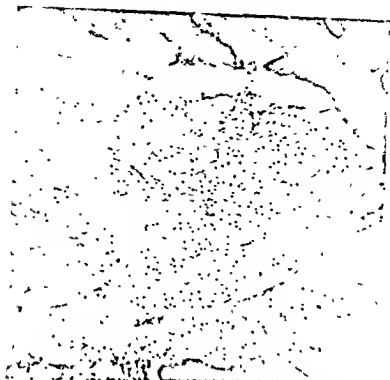


Figure 3. Microscopic section from hard palate showing atypical lymphocytes and bone erosion. ( $\times 100$ )

1.0 mm Al filter half-value layer 0.9 mm Cu, 1,500 r (in air). This raised the total tumor dose in the palate to 4,500 roentgens.

The patient tolerated this course of treatment well. The eyes and the oral commissures were protected by 4 mm of lead during the treatments. A second-degree erythema developed externally (fig. 6), and an ulcerative reaction developed in the palate. As the tumor regressed, there was a residual oronasal fistula at the junction of the hard and soft palate (fig. 7). By 14 December, all reactions had healed. There were no enlarged lymph nodes in the neck, and there was no evidence of residual neoplasia. The patient had gained 20 pounds during the treatment, and his general condition was good.

**Course.** A maxillary denture was constructed, which also served as a temporary obturator for the oronasal fistula. The patient was given physical disability discharge from the Army in April 1954 and subsequently observed at a Veterans Administration hospital at regular intervals.

Except for a chronic postnasal discharge there were no positive findings until January 1955, when radiographs disclosed a possible mass in the left maxillary sinus. A Caldwell-Luc procedure was performed on 21 January. The maxillary sinus was found to be free of masses. Multiple biopsies were performed, which revealed chronic



Figure 4. Microscopic section, area of tooth root apex, showing replacement of normal periodontium by atypical lymphocytes and possible destruction of cementum in one area. ( $\times 100$ )



Figure 5. Outline of external portals for radiation therapy. Figure 6. Second degree erythema following radiation therapy.





*Figure 7. Palate six weeks after beginning radiation therapy, showing regression of tumor and residual oronasal fistula.*

sinusitis but no evidence of recurrence of malignancy. Following this operation, an oroantral fistula developed. After one unsuccessful attempt at closure, the fistula was surgically closed in December. No recurrent malignancy was noted in either procedure.

In March 1956, a routine follow-up examination was again negative for recurrent malignancy. Examination at regular intervals will continue.

#### COMMENT

The lymphatics of the palate and the nasopharynx are the possible sites of origin in many reported cases of malignant lymphoma, and frequently there is a history of prolonged paranasal infection. When bone is involved in lymphosarcoma, such involvement is indicative of spreading rather than early disease.

In this case, the spread of disease was manifested by the perforation of the hard palate, loosening of teeth after replacement of the normal periodontium by tumor, fixation of the soft palate, fixation of the tonsils, enlargement of the upper cervical nodes, occlusion of the nasopharynx by a mass, and radiographic evidence of paranasal sinus involvement. Considering this regional spread and the nature of lymphosarcoma, a modified program of therapy directed at relief of symptoms was considered but rejected in favor of the attempt at curative therapy. The apparent absence of local recurrence or generalized disease after 2½ years is encouraging.

# Volkman's Contracture of the Lower Extremity

## A Complication of Patellar Tendon Transplantation

WALTER R. MILLER, *Captain, MC, USN*

**W**HENEVER an untoward incident occurs during a surgical procedure, there is an understandable reticence on the part of the surgeon to publish the case. If such information is given proper dissemination, however, it may assist in the recognition of premonitory signs in other patients, and possibly in the amelioration of residual damage. The following is such a case.

### CASE REPORT

A 17-year-old girl student, seen as an outpatient, complained of falling several times a week because of bilaterally dislocating patellas. This had been occurring for a number of years, but recently had become more frequent and, in view of her age, more embarrassing. Examination corroborated the diagnosis. The left patella could be completely dislocated off the lateral femoral condyle when the knee was in approximately 40° of flexion. The right patella could be subluxed only. Roentgenograms confirmed the suspicion that both lateral condyles were lower in profile than normal.

Transplantation of a bone block including the left patellar insertion was performed on 28 February 1952. The block was moved medially and slightly distally, and secured with a stainless steel screw. The usual freeing of the lateral aspect of the extensor mechanism was done, and followed by reefing along its medial border. In spite of having been dislocated frequently, the patella, although somewhat smaller than normal, presented an articular surface covered with normal, glistening cartilage. It rode in an accessory groove in the lateral condyle completely apart from the intercondylar notch. The medial femoral condyle was hardly recognizable as such. It was deformed and although it was partially covered with cartilage, the cartilage was covered with synovial membrane.

The completely uneventful procedure, which required 1 hour and 10 minutes from initial incision to skin closure, was accomplished under spinal anesthesia and with a pneumatic tourniquet of the Campbell-

Boyd type inflated to 480. The tourniquet was applied to the thigh but not inflated until after preparation of the skin, and spiral application of an Esmarch rubber bandage. Thus the tourniquet pressure began not more than five minutes prior to the incision. Following the operation, a long leg cast was applied over ample sterile sheet wadding, after which the tourniquet was deflated and removed. Total tourniquet time was slightly less than 1 hour and 30 minutes. Good color and warmth returned to the toes immediately. The patient was taken to the ward in good condition and the casted leg was elevated on several pillows. About eight hours postoperatively, the surgeon was called by the surgical watch officer, who stated that the patient was having some pain in the leg but that the color and temperature of the toes were satisfactory. The surgeon recommended that the cast be split and spread slightly. There were no more phone calls that night, and it was believed that all was satisfactory.

The following morning at 1000 the patient was writhing with pain, although her operated leg from which the cast had been completely removed appeared essentially normal. Color of the leg and foot was good, and the temperature was equal to that of the other leg. Capillary return time in the toes was good, but neither posterior tibial nor dorsalis pedis pulsations could be felt and no oscillations were obtained by oscillometer except above mid thigh, where they were normal. The calf muscles were firm and somewhat tender, and the foot was in moderate equinus. The foot could not be dorsiflexed even to neutral, and much discomfort was caused by the attempt. The patient was quite clear in stating that her severe pain was in the entire leg from the site of the tourniquet distally. The tourniquet site in mid thigh was very tender, more so than any other area.

Hypesthesia to anesthesia started 4 inches below the knee joint over the lateral aspect of the leg and about 8 inches below the knee joint on the medial side, the two areas joining anteriorly about 7 inches above the ankle joint. The skin over the calf and foot was almost completely anesthetic.

Consultation with the neurosurgeon and the anesthetist resulted in the use of continuous caudal block with Pontocaine (brand of tetracaine hydrochloride). This promptly relieved pain and caused the leg to be somewhat warmer than the unoperated leg. The patient also volunteered: "The leg feels like it's mine now down to just above the ankle." An oxygen tent used only for cooling was placed over the leg and the temperature maintained between 75° and 80°F.

On the following day consultation among the chiefs of the orthopedic surgical, general surgical, and neurosurgical services and two civilian consultants (neurosurgery and orthopedics) resulted in recommendation for lumbar sympathectomy. Following this procedure the leg was cradled in cotton in balanced suspension. The operative incision was unremarkable. The leg, including the heel, was warm, but the foot remained cool and pulseless although capillary return was adequate. Pain was reduced to moderate discomfort.

On about the third day, the calf muscles had reached a maximum of almost woody hardness and the picture of Volkmann's ischemic contracture was well developed. A small, quarter-sized area of blackened skin appeared on the heel, together with a small, blistered area overlying the tendinomuscular junction of the Achilles tendon. These both disappeared during the next two weeks.

In spite of gentle but persistent physiotherapy, followed later by a low leg brace with dorsiflexing foot spring, the foot over the next three months assumed a position of equinovarus of moderate severity ( $30^\circ$  of equinus). The operative wound healed without event. The patient could do a straight-leg raise with the knee locked in full extension in  $4\frac{1}{2}$  weeks postoperatively, and the patella was felt to ride medially in a normal position. Six months following operation she had a full range of motion in the operated knee, without effusion. The foot could be voluntarily dorsiflexed to about  $20^\circ$  below neutral and everted to neutral. There was gross rightness and some residual induration in the posterior calf muscles; however, there was evidence of slight return of function in these. The level of hypesthesia had moved distally at least 5 inches, but the entire foot was still anesthetic. Physiotherapy, including heel cord stretching, was continued and the patient was wearing a brace part time while waiting until surgical correction of the foot deformity would be indicated.

### DISCUSSION

The contracture I have described followed a relatively simple orthopedic operation on the anterior aspect of the leg performed under a properly applied pneumatic tourniquet. Search of the English literature revealed no other case of Volkmann's contracture of the leg following operation on the lower extremity, aside from a number of cases occurring as a complication of fracture of the femur. The condition is mentioned as a possibility by several authors while discussing the problem in the upper extremity.

To review in retrospect the situation as it confronted the operator at 10 o'clock on the morning following the operation, it was clear that splitting of the cast had not relieved the patient. Although she had required only two hypodermic injections of 10 mg of morphine and 60 mg of codeine during the first 20 hours postoperatively, she had complained of severe pain in the leg and of numbness in the foot and toes to such an extent that the entire cast had been removed in the early hours of the morning. At this time, according to the nurse's notes, "the toes and instep were blotched and blue." These were premonitory signs that could have been recognized and reported to the responsible surgeon. Whether earlier application of methods to reduce vascular spasm would have been effective in averting the residual damage will remain unknown, but it seems likely.

Much difference of opinion exists concerning when to explore the vessels in this condition. It was the opinion of those consulted in this case that since no trauma other than broadly distributed pressure from a pneumatic tourniquet had been inflicted on neurovascular structures, adequate blocking of the sympathetic outflow would be as effective or more so than operation in relieving vascular spasm. This view is supported by the report of Thomson and Mahoney<sup>1</sup> who state: "It seems significant that of all cases treated with sympathetic block (spinal anesthesia) only one was a failure and six were cured—muscle decompression with or without arterial exploration has proved to be of no value."

The opinion of Myrding<sup>2</sup> is of significance in cases that may become the subject for litigation: "Volkmann's ischemic contracture may result from injury when bandages, splints or casts of plaster of paris have not been used; this is a highly important fact, from a medicolegal point of view . . . I should like to emphasize again the great importance of the fact that Volkmann's ischemic contracture may result when there is no fracture and when no splint, bandage or cast has been applied."

#### SUMMARY

A case of Volkmann's contracture of the lower extremity following a relatively simple orthopedic procedure is presented. No report of a similar case could be found on search of the English literature. Early recognition of premonitory signs and symptoms of this complication is of the greatest importance, so that early treatment can be instituted and residual damage be reduced to a minimum.

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"Internal medicine is the most popular medical specialty in the Army with surgery as a close second. Seventeen per cent of the 681 medical officers, both Regular Army and Reserve, holding specialty certification are diplomates in internal medicine. About fifteen per cent are in the surgical group. The remaining 68 per cent is distributed among 23 specialties and subspecialties."

—Technical Liaison Office,  
Department of the Army,  
Office of the Surgeon General.  
Information Release of 19 July 1956

# Situs Inversus of Gastro-intestinal Tract

## Complication by Partial High Intestinal Obstruction

RICHARD R. PICHEL WARNER, *Captain, USAF (MC)*

**T**RANSPOSITION of the stomach alone, or with situs inversus of all the infradiaphragmatic viscera, is ordinarily asymptomatic although sometimes associated with eventration of the right diaphragm.<sup>1</sup> Situs inversus of the intra-abdominal organs occurs once in every 6,000 to 8,000 individuals<sup>2</sup> and is more common than partial transposition or incomplete rotation of a portion of the gastro-intestinal tract. The latter condition, however, frequently produces symptoms, and the majority of such patients are brought to medical attention during early infancy. Occasionally an individual who has symptoms resulting from anomalous rotation of a portion of the gastro-intestinal tract will not seek medical attention until early adulthood because his symptoms may have been mild, although chronic. Only in recent years has it been appreciated that such congenital anomalies need not produce clinical manifestations until early adult life.<sup>3,4</sup> Since the majority of military personnel are in this age category, the military physician should be acquainted with the symptoms and realize that such conditions may occur in young adults, and are not exclusively confined to infants and children.

### EMBRYOLOGY

In order to understand the genesis of the group of conditions resulting from faulty rotation of the gastro-intestinal tract, it is necessary to have an understanding of the main features of the process whereby the gastro-intestinal tract attains its final asymmetrical arrangement.<sup>3-5</sup>

The digestive tract of the embryo is divided into a foregut, midgut, and hindgut. The midgut extends from the third portion of the duodenum to the midtransverse colon. Distal to this area is hindgut, and proximal to it is foregut.

At the fourth week of fetal life, the primitive gut hangs in the midline supported by a common dorsal mesentery. A fusiform dilatation, the future stomach, appears, and just below this the liver diverticulum and the bud that gives rise to the pancreas develop. The primitive stomach becomes further dilated so that

its right surface is directed backward with the greater curvature facing downward and to the left. Due to this rotation, the liver and pancreas are carried from the midline to their respective final positions. If the stomach and descending portion of the duodenum rotate to just the opposite position from that described, the liver, pancreas, and spleen will then be carried along and be situated in such a way that they present a mirror image of their normal positioning; *i. e.*, *situs inversus*.

While the development and rotation of these portions and growths from the foregut are occurring, development and migration of the midgut is also underway. The midgut is divided into a prearterial portion, which extends from the third portion of the duodenum to the vitelline duct, and the postarterial portion, which extends from the vitelline duct (or Meckel's diverticulum) to the midtransverse colon. Between the sixth and tenth weeks the gut grows too rapidly for the celomic cavity to accommodate it. This results in the protrusion of a part of the midgut into the base of the umbilical cord (fig. 1A). By the tenth week, however, the peritoneal cavity becomes large enough to contain this portion of the midgut, and it is withdrawn from the base of the umbilical cord. As it enters the abdomen, it rotates in a counterclockwise direction so that the postarterial portion of the midgut (the segment from vitelline duct to midtransverse colon) is situated in the left side of the abdomen. This anticlockwise rotation continues after the midgut is entirely within the abdomen so that the cecum, which initially is in the left midabdomen, migrates to the left epigastrium and thence to the right epigastrium (fig. 1B), and finally swings around to its adult position in the right lower quadrant. The cecum and ascending colon then acquire their peritoneal reflections and attachments in the right side of the abdomen. At the same time, the small bowel, which also has been rotated in a counterclockwise direction, becomes firmly attached to the posterior abdominal wall by its mesentery.

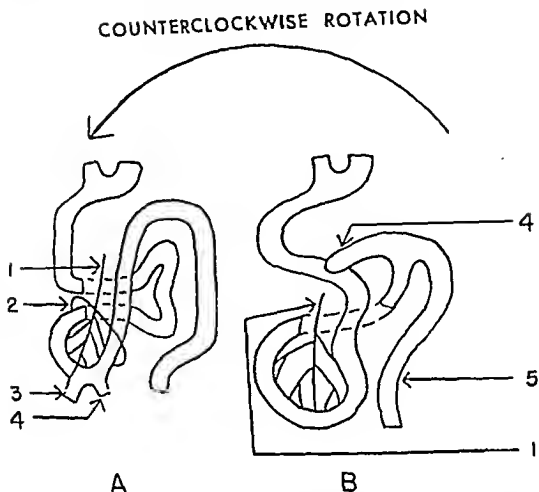


Figure 1. Embryology. (A) Protrusion of a portion of the midgut into the base of the umbilical cord at 6 to 10 weeks' stage of development. (B) Midgut has re-entered abdomen at 10 to 12 weeks' stage of development and has undergone partial counterclockwise rotation so that cecum lies in right upper quadrant. This rotation will normally continue and will carry the cecum to the right lower quadrant, its final position.

1-Superior mesenteric  
artery  
2-Umbilical orifice

3-Vitelline duct  
4-Cecum  
5-Descending colon

midgut may not occur. Most of the midgut, and particularly the postarterial portion, may still go to the left side of the peritoneal cavity upon entering the abdomen, but then the process of counterclockwise rotation may not go to completion, perhaps because of the large liver mass located in the left upper quadrant. This may then result in the cecum and most of the colon being located in the left side of the abdomen; the cecum may be mobile, and there may also be nonfusion of the mesentery of the midgut so that the small bowel hangs on a pedicle of the superior mesenteric artery.

Therefore, three types of abnormalities may occur to the midgut in association with or without situs inversus of the stomach and liver: (1) return of the midgut to the abdomen without any rotation;



2 inches in height and weighed 170 pounds. His usual weight had been 195 pounds. Vital signs were normal. Hydration was only fair. There was a prominent sternum and a slight pigeon-breast type of sternal deformity. The remainder of the physical examination disclosed no significant abnormalities.

**Laboratory Findings.** Peripheral blood studies at the time of admission revealed a red blood cell count of 3.7 million per  $\mu$ l; hemoglobin was 11 g per 100 ml; hematocrit, 52.5 ml per 100 ml; reticulocyte count, 1.1 per cent; and white blood cell count, 13,400 per  $\mu$ l with a slight shift to the left. The stool contained traces of occult blood. Urinalysis showed no abnormalities. Determinations of the fasting blood sugar, serum chlorides, and basal metabolic rate all yielded values within normal limits. The gastric contents after fasting contained 65° of free acid, and after histamine, 90° were present. An electrocardiogram showed no significant abnormalities. A roentgenogram of the chest was normal. The heart was in its normal position on the left. No defects in the diaphragms were noted. An upper gastro-intestinal series demonstrated situs inversus of the abdominal organs and an anomalous course of the duodenum. There was spasm of the pylorus and the duodenal bulb could not be well outlined. No deformity or ulcer crater could be seen. Several more upper gastro-intestinal series and roentgenograms of the small bowel were taken with the intent of studying the anomalous duodenum in detail. Barium was introduced by Levin tube in one of these studies. The duodenal bulb was well visualized and showed no deformity or ulceration. The anomalous course of the duodenum was well demonstrated (fig. 2), and considerable dilatation of the bulb and first portion of the duodenum was seen. A point of obstruction was visualized low in the descending limb of the duodenum (fig. 3). At this point, the transverse mucosal folds were converted into vertical striations. There was delayed passage of barium past this point. The picture was felt to represent partial obstruction due to extrinsic pressure as might be caused by a mesenteric band. Beyond this area, there was a reversed loop of the duodenum before it passed into the proximal jejunum, which went high and posteriorly on the right side of the abdomen. The cecum was low on the left side of the abdomen. A congenital anomaly of the lumbar spine consisting of failure of segmentation of L5 and S1 was present. An intravenous pyelogram showed two normal kidneys and ureters.

**Course in Hospital.** The patient was initially maintained on a nutritious liquid diet and antacids. After two weeks, symptoms of obstruction disappeared and he was allowed a more nearly regular diet. His work-up was completed, and on 9 June 1955 he was operated on.\*

At operation, as seen on the roentgenograms, his abdominal viscera were completely transposed from left to right in a mirror image of the normal arrangement. The cecum was completely mobile and the small

\*Operation was performed by Capt. Gilbert L. Chamberlin, USAF (MC).



*Figure 2. Roentgenogram demonstrating situs inversus of the stomach and anomalous course of duodenum.*

intestine's mesentery was attached to the posterior abdominal wall for only eight centimeters. The appendix contained several fecaliths. The jejunum and ileum were normal as was the ligament of Treitz. The duodenum was elongated to about 15 inches and was enveloped in peritoneal folds, which at the most dependent portion of the duodenum had kinked this loop of gut in a sharp 180° angle. This point of sharply angulated gut was just below the attachment of the duodenum to the pancreas. From this point, the duodenum crossed itself, ran laterally upward and back across itself again, and then posteriorly to the superior mesenteric artery to reach the ligament of Treitz. Two normal kidneys were present, but a right retroperitoneal mass was noted and proved to be an accessory kidney. The duodenum was mobilized and its kinked dependent portion was straightened out by freeing it from the enveloping mesenteric folds. It was felt that this would be sufficient to relieve the patient's symptoms of recurrent partial intestinal obstruction. The appendix was also removed.

Postoperatively, the patient's convalescence was entirely uneventful, and three weeks after surgery he was returned to duty. When seen three months later, he was entirely free of gastro-intestinal symptoms and eating a regular diet.



*Figure 3. Roentgenogram demonstrating considerable dilatation of the duodenal bulb and first portion of the duodenum, with point of partial obstruction in descending limb of duodenum just proximal to sharp angulation.*

It was believed at the time of operation that, although incomplete, the attachment of the small intestine's mesentery to the posterior abdominal wall was sufficient to render the possibility of volvulus unlikely. Therefore, no attempt was made to immobilize the small bowel by further attaching its mesentery. The increased incidence of duodenal ulcer in association with partial obstruction at the duodenum due to congenital bands or adhesions<sup>7</sup> was appreciated. Hence, roentgenographic studies were meticulously performed in the search for an ulcer. Such ulcers are felt to be due in large part to stasis. Our patient may have had such an ulcer in the past or at the time of admission, and its bleeding would explain the mild anemia and occult blood in the stools found when he was hospitalized. Such an ulcer at the time of admission could have been a very superficial one and could have healed prior to operation. In such ulcer cases, since stasis is the major causative factor, the surgical relief of the duodenal obstruction is usually sufficient to result in cure.

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### THE FOUR STAGES OF KNOWLEDGE

"Where are we in our efforts to understand arteriosclerosis? Well, certainly not very far. Discovery in general can, I think, be divided into four stages. The first is the period of uncoordinated fact collecting—the naturalist or "butterfly net" period. This is the period of magnificent indifference; in it lie the seeds of discovery but the inner structure is barely discernible. The second is the period of controversy—the "rhubarb stage" of the ball game. This stage is often called one of "scientific controversy" to make it sound less like the rhubarb that it really is. It has the merit that there is probably something worth arguing about if this stage is reached. It is healthy so long as young investigators understand its nature and not take it, or themselves, too seriously. The third is the period of definition and clarification—the "white of an egg stage" because someone clarifies the problem by precipitating the irrelevant sediment. The fourth and last is the period of solution or fruition—the "bravo stage" in which everyone, or nearly everyone, agrees, applauds and goes home and from then on nobody does much more about it, except in some rare cases, collects royalties.

"I think you will agree that research in arteriosclerosis stands about half way between the first and second stages."

—IRVINE H. PAGE  
in *Minnesota Medicine*, p. 743,  
Nov. 1955

## Departments

### A MESSAGE FROM THE A. M. A.

A recently published letter from an anonymous captain received wide circulation among military personnel. The correspondent attempted to establish that the basic cause of the acute shortage of doctors in the armed services is that there are simply not enough available physicians in this country. To support his opinion, the captain accused the American Medical Association of limiting the number of medical schools as well as the number of licensed physicians. Specifically, he charged that (1) the A. M. A. began a policy 50 years ago of closing down medical schools; (2) only 1 out of every 10 or 20 applicants is admitted to a medical school; and (3) the A. M. A. started a policy of refusing to permit Americans who are graduates of European medical schools to take state medical board examinations.

Statements like this are not new, and unfortunately they have been repeatedly made in public print. Are they fact or fiction? Well, let's examine the record and see.

As to the first charge, *the American Medical Association has never closed any medical school*. In fact, it has neither the authority nor the desire to control the growth of medical schools. Some 56 years ago, a report on the unsavory quality of medical education in the United States was published as a result of a study spearheaded by Dr. Abraham Flexner. The report clearly revealed that only about one third of the schools then in existence were offering a satisfactory medical education adequate to meet the needs of that period. The report shocked reputable medical educators, and their actions brought speedy results. A vigorous house cleaning ultimately wiped out about two hundred fly-by-night schools which were either diploma mills or had facilities, personnel, or financing inadequate to offer a medical education suitable for that period. From 1910 until about 1928, medical schools were classified as A, B, or C in terms of their over-all potentialities; B or C schools either improved or closed their doors. This type of classification was discontinued in 1928, and since that time medical schools have been approved or not approved.

The American Medical Association Council on Medical Education and Hospitals has worked closely with the Association of American Medical Colleges in constant efforts to assist in developing and maintaining sound standards of medical education

From the Council on National Defense of the American Medical Association. The views and opinions expressed are not necessarily those of the Department of Defense.—Editor.

in the United States in the interests of the American public, which the graduates of our medical schools must serve. These two organizations have exerted great influence in medical education. They have co-operated in stimulating and encouraging new medical schools, and have assisted in the improvement of those in existence by establishing sound, basic essentials of medical education, as well as by consultations, advice, and survey evaluation.

The number of approved medical schools in the United States increased from 66 in 1910 to 81 in 1955, a growth of 22.7 per cent. On the basis of new schools now under development, the number will have increased 30 per cent by 1960. In 1955, there were 28,583 students enrolled in medical schools as compared with 12,530 in 1910. The number of physicians graduated from approved medical schools since 1910 has far outstripped the growth of the over-all population of the United States. While our general population was increasing 80 per cent, the supply of doctors increased 120 per cent. Today, we have not only more doctors, but far better care than a generation or two ago. Physicians now treat a great many more patients and treat them more efficiently.

The second charge is likewise incorrect and not supported by the facts. Simple arithmetic establishes that *over half of all applicants were accepted into medical schools in 1953-1954 and in succeeding years*. The exact ratio of admissions to the number of applicants for 1953-1954 was 1 to 1.97, or 7,749 admissions out of a total of 14,678 applicants; for 1954-1955 it was 1 to 1.93, or 7,556 admissions out of a total of 14,538 applicants. Several years ago, publicity was given to the number of applications filed rather than to the total number of applicants filing them. This was incorrectly interpreted to mean that only 1 out of every 10 or 20 applicants is admitted to a medical school. The fact is that each applicant usually applies to some 2 to 4 or 5 medical schools. This means, of course, that the number of applications filed represents many times the number of people who are actually applying for admission to a medical school. For example, in 1953-1954 there were 48,556 applications for admission to medical schools, made by 14,678 individuals. Each applicant filed an average of 3.3 applications. Even at the peak period of admission to medical schools in 1948-1949, when large numbers of young men were being released from military service, the ratio of applicants to admissions was never higher than 3.6 to 1.

The third charge is a fallacy. By state statutes, it is the function and authority of the individual states to determine who shall practice within their borders, and to maintain high standards of medical practice in accordance with their respective rules and

regulations. The State Boards of Medical Examiners are independent agencies, and *the licensing in each state is done on the basis of the individual medical practice acts of the states concerned and the determinations of the various individual licensing bodies.* There are 20 medical licensing boards that permit licensure of foreign-trained physicians. On the other hand, foreign-trained physicians are not eligible for licensure by 12 boards. Special requirements for foreign-trained physicians are specified by 18 boards, while 16 boards have varying exemptions. In the final analysis, medical licensure in the United States is a "sovereign state right" that is entirely under the jurisdiction of the governments of the individual states.

The captain's suggestion for the creation of a medical academy to produce medical officers for the Armed Forces is not new. This idea has been carefully considered for a number of years by Congress, the military services, the medical profession, and groups of medical educators. All who have looked into the problem agree that, if the services are to produce their own physicians, it is far better and cheaper to subsidize the education of medical students in existing medical schools than for the Federal government to create, equip, and staff a separate medical academy. Furthermore, all groups agree that the present diversification in background and training of medical officers who have graduated from a number of different medical schools is a distinct advantage to military medicine.

Based on these decisions, the military services recommended legislation to the last Congress that would have permitted the subsidization of medical students under contract to become career military medical officers upon the completion of their training. This recommendation had the whole-hearted support of the medical profession.

Before Congress had completed final action on the proposal, however, the military services found it possible to establish a program of subsidizing the training of selected senior medical students in return for commitments of military service. This program is now in operation with the full support of the medical profession and medical educators. Studies are currently under way to determine the feasibility of extending this program to include junior medical students as well.

Programs of this type, together with the recently enacted career incentive bill for medical officers, should prove of great assistance in solving the basic problem.

## EMINENT ARMY UROLOGIST DIES

Colonel James C. Kimbrough, MC, USA (Ret.), age 68, died on 19 August 1956 at Walter Reed Army Hospital, where he had served for the past 10 years.



From 1946 to 1953, he was chief of the hospital's Urology Service. In August 1953, upon retiring from the U.S. Army after 36 years of service, he was designated by an Act of Congress as consultant in urology to Walter Reed Army Medical Center, "... in recognition of the outstanding service and contribution made to the science of medicine and surgery... and to provide that his mature professional judgment and long experience may continue to remain available to the public service ...."

A native of Madisonville, Tenn., he was graduated from Hiwassa College and from Vanderbilt University School of Medicine before entering the military medical service in July 1917. Since 1921, he served almost exclusively as chief urologist at various Army hospitals, including four duty tours at Walter Reed. He was also Chief of the Professional Services Division in the Office of the Chief Surgeon, European Theater of Operations, from 1942 to 1945.

In World War I, Colonel Kimbrough received the Purple Heart award, and a Meritorious Service Citation signed by General of the Armies John



J. Pershing. In World War II, he was awarded the Legion of Merit and the Bronze Star Medal. In 1952, he was awarded a plaque by the American Urological Association, of which he was a member, in recognition of his "contributions to the advancement of science and practice of urology" and for his "efforts in promoting pleasant working relations between civilian and military medicine," and in 1955 he was elected president of that association's Mid-Atlantic Section, the first time in the association's history that a former Army officer had held the position. Since his death the annual postgraduate refresher course in urology at Walter Reed has been named in his honor.

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#### FIRST INTERNATIONAL CONGRESS OF NEUROLOGICAL SCIENCES

The First International Congress of Neurological Sciences will be held in Brussels, Belgium, 21-28 July 1957. This Congress is the first integrated international convention of all independent international congresses of several neurological disciplines. Meeting simultaneously in Brussels under the new co-ordinated program are Sixth International Neurological Congress, Fourth International Congress of Electroencephalography and Clinical Neurophysiology, Third International Congress of Neuropathology, First International Congress of Neurological Surgery, Third Meeting of the International League against Epilepsy, and Second Symposium Neuroradiologicum.

The scientific program will highlight two major symposia of common interest to the Congress: Extrapyramidal Disease, by Professor Raymond Garcin of Paris, and the Significance and Interpretation of Modifications of the Conscious State, by Sir Geoffrey Jefferson of London. Special interest symposia will include Multiple Sclerosis, under the Chairmanship of Professor H. Houston Merritt of New York.

Further information may be obtained from Dr. Pearce Bailey, Secretary, Committee for the United States of the Sixth International Neurological Congress, National Institutes of Health, Bethesda 14, Md.

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#### DEATH

ALTEE, Miriam Elizabeth, Lieutenant, NC, USN, of Columbia, S. C.; Chief Nurse at U. S. Naval Air Station, Norfolk, Va.; graduated from the Petersburg Hospital School of Nursing, Petersburg, Va., 12 August 1937; appointed, Nurse, in the U. S. Navy and ordered to active duty 6 May 1940; died 24 August 1956, age 43, at the U. S. Naval Hospital, Portsmouth, Va., of metastatic carcinoma of the vertebrae.

# Promotions of Officers

The following officers of the military medical services on active duty in the Army, Navy, and Air Force have recently received temporary promotions to the rank indicated.

## MEDICAL CORPS

ACKERMAN, Gustavo A., Capt., USA  
 ADDICHI, James A., Capt., USN  
 ADLER, Sheldon P., Capt., USA  
 AGUILO-DIER, Jose, Capt., USA  
 AISEN, Philip, Capt., USA  
 ALPERT, Chalom A., Capt., USA  
 ALDEN, Alfred M., Capt., USA  
 ALONSO, Cespedes T., Capt., USA  
 ANDERSON, Roland G., Capt., USA  
 ARDAM, Irwin H., Capt., USA  
 ASHFORD, Thomas P., Capt., USA  
 ATCREGAN, A. A., Capt., USA  
 BAER, Robert B., Capt., USA  
 BAKER, John R., Capt., USA  
 BALLENTINGER, Louis P., Capt., USN  
 BARLOW, Peter P., Capt., USA  
 BARR, Solomon E., Capt., USA  
 BASCHAM, Byron E., Capt., USN  
 BATTLE, William G., Capt., USA  
 BAZILIAN, Stanford, Capt., USA  
 BEGUESER, Edwy C., Capt., USA  
 BEITHICH, Paul J., Capt., USA  
 BELGRADE, Joseph E., Capt., USA  
 BELVILLE, Donald R., Capt., USA  
 BENNETT, Stephen L., Capt., USA  
 BERLACHER, Franz J., Capt., USA  
 BERNSTEIN, Eugene F., Capt., USA  
 BERRY, Reginald V., Capt., USN  
 BETHANY, Joe J., Jr., Capt., USA  
 BEVER, Lloyd J., Capt., USA  
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 BLOCK, Alvin L., Capt., USA  
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 BOWLES, Richard P., Capt., USA  
 BOWMAN, F. O., Jr., Capt., USA  
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 BOYERS, James H., Capt., USN  
 BRADSHAW, Robert H., Capt., USN  
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 BRILL, Norman R., Capt., USA  
 BRODY, Sidney I., Capt., USN  
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 BROWN, Ralph R., Capt., USAF  
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 BUNDENS, Warner D., Jr., Capt., USN  
 CAMBOR, Charles G., Capt., USA  
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 CAMPBELL, Donald F., Capt., USA  
 CANAGA, Bruce L., Jr., Capt., USN  
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 CASTEE, Byron D., Capt., USN  
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 COLLIER, Robert H., Capt., USA  
 COMPTON, William A., Jr., Capt., USA  
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 COCK, Thomas W., Capt., USA  
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 COFF, Donald J., Capt., USA  
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 COHEN, Maurice C., Capt., USA  
 CROCKETT, Robert F., Capt., USA  
 CROMBIE, James F., Capt., USA  
 CROWDER, Albert E., Capt., USA  
 DALEPORT, G. F., Maj., USA  
 DAVIS, Joseph P., Capt., USA  
 DEGENBERG, L. H., Maj., USA  
 DEGRUCH, Perry F., Capt., USA  
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 DUNN, Joel P., Capt., USA  
 DEYOUNG, Joe J., Capt., USA  
 DIXON, George L., Jr., Capt., USA  
 DIXON, Leon H., Capt., USA  
 DOOGAN, William P., Capt., USA  
 DODD, Arnold R., Capt., USA  
 DORFMAN, Howard D., Capt., USA  
 DOTCH, Franklin, Capt., USA  
 DOTCH, C. C., Jr., Capt., USA  
 DUFFNER, Gerald J., Capt., USN  
 DUFFY, John L., Capt., USA  
 DUFFY, Thomas L., Capt., USN  
 DUNLEAVY, James D., Capt., USA  
 EDWARDS, Edward H., Capt., USA  
 EDMONDSON, Robert C., Capt., USA  
 EMBERTON, Robert, Capt., USA  
 ELLIOTT, Edward H., Maj., USA  
 ELSON, Charles E., Capt., USA  
 ENNE, Henry R., Capt., USN  
 ESHELMAN, Elias K., Capt., USA  
 FALLIS, Bruce D., Capt., USA  
 FERNANDEZ, Manuel C., Capt., USA  
 FILIPOVICH, Orest F., Capt., USA  
 FLETCHER, Robert O., Capt., USA  
 FOLEY, Michael J., Capt., USA  
 FONTAINE, Roger J., Capt., USA  
 FORD, George W., Capt., USA  
 FOREMAN, Lee S., Capt., USAF  
 FRANK, John D., Capt., USA  
 FRAZER, Joe W., Jr., Capt., USA  
 FRIEDMAN, Herbert S., Capt., USAF  
 FRUEHOLZ, Frederick, Capt., USA  
 FUJII, Tetsuro, Capt., USA  
 GAINES, Leonard M., Jr., Capt., USAF  
 GAIYON, James T., Capt., USA  
 GANZ, Aaron, Capt., USA  
 GARCIA, Margarida M., Capt., USA  
 GARZA, Harold R., Capt., USA  
 GELINAS, Joseph A., Maj., USA  
 GERBER, Marvin L., Capt., USN  
 GEORGESEN, Lloyd W., Capt., USA  
 GEYER, Charles H., Capt., USA  
 GOLDBERG, Arnold L., Capt., USA  
 GOLDBERG, Morris M., Capt., USA  
 GOLDSBOROUGH, John, Capt., USA  
 GOLDMAN, Armond S., Capt., USA  
 GOLDSMITH, Richard, Capt., USA



MURRAY, Thomas P., Capt., USA  
 MYERS, Joseph H., Capt., USA  
 NAST, Philip R., Capt., USA  
 NEEDLEMAN, H. L., Capt., USA  
 NELSON, John W., Capt., USA  
 NOLEN, William A., Capt., USA  
 NORMAN, Clyde W., Capt., USN  
 NOVY, Philip L., Capt., USN  
 O'BRIEN, Richard F., Capt., USA  
 O'DONOGHUE, John A., Capt., USN  
 OPPERHEIMER, Jack H., Capt., USA  
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 PANARO, Victor A., Capt., USA  
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 PENFIELD, Amos J., Capt., USA  
 PENTON, George E., Capt., USA  
 PERNA, Vincent P., Capt., USA  
 PERRY, Richard F., Capt., USA  
 PHILLIPS, John H., Capt., USA  
 PHILLIPS, Philip B., Capt., USN  
 PINTO, Joseph C., Capt., USN  
 PITARO, Nathan A., Capt., USA  
 PITTS, Frederick W., Capt., USA  
 PLYMYER, Ray F., Capt., USA  
 POLCYN, Benedict M., Capt., USA  
 PONTOPPIDAN, Henning, Capt., USA  
 POCHI, Cho T., Capt., USA  
 PORTENAR, Myron A., Capt., USA  
 PORTER, William M., Capt., USA  
 POWERS, Joseph F., Capt., USA  
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 RAU, David H., Capt., USA  
 RAWITCH, Marvin A., Capt., USA  
 REAVEN, Gerald M., Capt., USA  
 REESE, Norman O., Capt., USA  
 REHM, Robert A., Capt., USA  
 RICCI, Mario G., Capt., USA  
 RICHIEY, Eldred T., Jr., Capt., USA  
 RICHMOND, Roland W., Capt., USA  
 REDDLE, Lindsay R., Capt., USN  
 RIGGLE, Allen C., Capt., USA  
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 ROSSIE, William A., Capt., USN  
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 RCEVER, Harold D., Capt., USA  
 ROGER, Shelton, Capt., USA  
 ROLAND, Frederick H., Capt., USAF  
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 ROSENBLATT, Morton, Capt., USA  
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 ROSS, Melvin B., Capt., USA  
 ROSS, Ralph D., Capt., USN  
 ROSTON, Sidney, Capt., USA  
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 SANDNER, Donald F., Capt., USA  
 SCADUTO, Louis E., Capt., USA  
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 SHYDER, Parker W., Capt., USA  
 SHIFF, Melvin, Capt., USA  
 SHANNON, Jack D., Capt., USAF  
 SHAW, William A., Capt., USA  
 STEIN, Moses L., Capt., USA  
 STEINMAN, Arnold M., Capt., USA  
 STEIN, George C., Capt., USA  
 STEIN, Howard L., Jr., Capt., USA  
 STEIN, Robert F., Capt., USA  
 STEINBLAND, William M., Jr., Capt., USAF  
 STEIN, Jack, Capt., USA  
 STEINHA, Paul W., Capt., USA  
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 TAYLOR, James P., Capt., USA  
 TAYLOR, Thomas L., Capt., USA  
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 TERPILL, Thomas F., Capt., USA  
 TERRY, James K., Maj., USA  
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 THOMSON, Ernest C., Capt., USA  
 THOMAS, P. A., Capt., USA  
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 THORP, Jack H., Capt., USA  
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 THOM, Carl J., Capt., USA  
 TURLIN, Ira H., Capt., USA  
 TUCKER, John D., Capt., USN  
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 Van DerWOUDE, H., Capt., USA  
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 VEST, Leonard A., Capt., USA  
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 VOGL, Gordon J., Capt., USA  
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 WHITE, William A., Capt., USAF  
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 WRIGHT, Gene E., Capt., USA  
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YUTHAH, Catherine, Capt., USA

HERNE, Stanley R. M., Capt., USA  
SOLL, Daniel R., Capt., USA  
TUFFERTY, S. A., Capt., USA

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BERNTHED, Aron, Capt., USA  
BENKOWITZ, J. E., Capt., USA  
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BOGDANSKY, S. J., Capt., USA  
BOYLAND, John J., Capt., USA  
BRADLEY, George W., Capt., USA  
BRYCE, George C., Jr., Capt., USA  
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CALMAN, Clarence M., Capt., USA  
CARLSON, Leo T., Capt., USA  
CARLSON, James P., Capt., USA  
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CHAMBER, John L., Jr., Capt., USA  
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GRAYSON, Ardis J., Capt., USA  
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TYLER, Robert J., Capt., USA  
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WARRIN, William L., Capt., USA  
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WHITNEY, Frank T., Jr., Capt., USA  
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WILLIFORD, William, Capt., USA  
WOLFE, Leroy A., Capt., USA  
WOLFE, Irving, Capt., USA

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BEATTY, Marion, Capt., USAF  
BRADEN, Robert A., Capt., USAF  
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DUNKERTON, Euel A., Capt., USAF  
FOSS, Robert C., Capt., USAF  
GIBB, Claude R., Capt., USAF  
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GRULLO, Gino P., Capt., USAF  
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KESTFE, Lewis J., Capt., USAF  
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KIRBY, James D., Capt., USAF  
PASCO, John E., Capt., USAF  
POLEY, George W., Capt., USAF  
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VANDAY, Farneth F., Capt., USAF  
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BOLDEN, Irma, Capt., USAF  
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CLEMETECH, Alvin L., Capt., USAF  
COMER, Ross L., 1st Lt., USAF  
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FRANZOS, Anna M., Capt., USAF  
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HALEY, Lorraine M., 1st Lt., USAF  
PAMUND, Patricia A., 1st Lt., USAF  
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NIXON, Eva C., Capt., USAF  
PARRISH, Lillian H., Capt., USAF  
PETRUCCI, Nora J., Capt., USAF  
POLLEY, Fort H., Capt., USAF  
SALENTIN, Norma A., Capt., USAF  
SEIBERT, Dolores L. S., Capt., USAF  
SMITHSON, Clara F., Capt., USAF  
STANLEY, Joyce M., Capt., USAF  
SPACKMAN, Helen J., Capt., USAF  
SPINELL, Marie T., Capt., USAF  
STERNHOFF, Mary L., Capt., USAF  
THOMAS, Lorna R., Capt., USAF  
THOMPSON, Patsy M., Capt., USAF  
WEAVER, Phyllis J., Capt., USAF

## ANNUAL MEETING OF MILITARY SURGEONS IN WASHINGTON, D. C., NOVEMBER 12-14

The expanding horizons of military medicine will be the theme of the 63d annual convention of the Association of Military Surgeons of the United States which will be held at the Statler Hotel, Washington, D. C., from 12-14 November 1956. In addition to the program listed below, a record number of 14 technical and scientific exhibits have been planned for display throughout the meeting.

### Monday Morning, 12 November

*Presiding:* Rear Adm. Winfred P. Dana, MC, USN, President

*Association President's Address*—Rear Adm. Winfred P. Dana, MC, USN, Assistant Chief for Aviation and Operational Medicine and Research and Medical Military Specialties, Bureau of Medicine and Surgery, Department of the Navy.

*Welcoming Remarks*—Edward H. Cushing, M. D., Deputy Assistant Secretary of Defense (Health and Medical).

*Guest Speaker*—Detlev W. Bronk, Ph. D., President, National Academy of Sciences.

*Expanding Horizons: Career Incentives*—Rear Adm. Bruce E. Bradley, MC, USN, Acting Surgeon General, Department of the Navy.

*Medicare Law*—Maj. Gen. Silas B. Hays, MC, USA, Surgeon General, Department of the Army.

*Expanding Horizons of Aviation Medicine*—Maj. Gen. Dan C. Ogle, USAF (MC), Surgeon General, Department of the Air Force.

*Expanding Horizons: Teamwork in Civilian and Military Health Services*—Leroy E. Burney, M. D., Surgeon General, U. S. Public Health Service, Department of Health, Education, and Welfare.

*Expanding Horizons in Research and Education in the Veterans Administration*—Roy A. Wolford, M. D., Deputy Chief Medical Director, Veterans Administration.

### Monday Afternoon

*Presiding:* Winchell McK. Craig, Rear Adm., MC, USNR (Ret.), Section of Neurological Surgery, Mayo Clinic, Rochester, Minn.

*Hormone-Producing Tumors*—Ray Hertz, M. D., Chief, Endocrinology Branch, National Cancer Institute, National Institutes of Health.

*Replacement Arthroplasty in Military Patients*—Lt. Col. Earl W. Brannon, USAF (MC), 3700th U. S. Air Force Hospital, Lackland Air Force Base.

*Preliminary Studies on Bovine Embryo Skin Grafts*—Lt. A. N. Silvetti, MC, USNR, Naval Medical Research Institute, National Naval Medical Center, and Blair O. Rogers, M. D., Clinical Instructor in Plastic Surgery, New York University College of Medicine.

*Experiences with the Adenovirus Vaccines in Navy Recruits* (Co-operative studies of the U. S. Navy, the University of Chicago, and the U. S. Public Health Service)—Joseph A. Bell, M. D., Chief, Epidemiology Section, Laboratory of Infectious Diseases, National Institute of Allergy and Infectious Diseases, National Institutes of Health.

### Tuesday Morning, 13 November

**Presiding:** Brig. Gen. Stanhope Bayne-Jones, MC, USAR (Ret.), Formerly Technical Director of Research, Office of the Surgeon General, Department of the Army.

*Significance of Leptospirosis in Military Medicine*—Lt. Col. Leslie C. Murphy, VC, USA, Deputy Director, Division of Veterinary Medicine, Walter Reed Army Institute of Research.

*Rapid Extracorporeal Oxygenation of Banked Blood*—Capt. William G. Malette, USAF (MC), Resident Surgeon, Denver Veterans Administration Hospital; William B. Summers, M. D., Denver Veterans Administration Hospital; and Ben Eiseman, M. D., Chief of Surgical Service, Denver Veterans Administration Hospital, and Associate Professor of Surgery, University of Colorado School of Medicine.

*Military Operations in Radiologically Contaminated Areas*—Lt. Col. James B. Hartgering, MC, USA, Director, Division of Physiology and Pharmacology, Walter Reed Army Institute of Research.

*Anorganic Bone: Chemistry, Anatomy and Biological Reaction*—Comdr. Fred L. Losee, DC, USN, Naval Medical Research Institute, National Naval Medical Center, and Lloyd A. Hurley, M. D., Harlan Memorial Hospital, Harlan, Ky.

*Late X-Ray Evidence of Spontaneous Reduction of Dislocation of Cervical Intervertebral Discs*—Benjamin H. Kesert, Col., USAR, Consultant in Neurology, Veterans Administration Hospital, Hines, Ill.; Associate, Department of Neurology and Psychiatry, Northwestern University Medical School.

*X-Ray Cineradiography and Portable X-Ray Units*—Adolph T. Krebs, M. D., Head, Radiobiology Department, Army Medical Research Laboratory, Fort Knox, Ky.

### Tuesday Afternoon

**Presiding:** Col. Victor A. Byrnes, USAF (MC), Director of Professional Services, Office of the Surgeon General, Department of the Air Force.

*Preservation of Whole Blood by Freezing*—Harold F. Meryman, M. D., Department of Internal Medicine, Yale Medical School.

*Cold Weather Survival*—Maj. Stanley Lutz, Jr., USAF (MC), Assistant Surgeon, Headquarters, 18th Air Force, Donaldson Air Force Base.

*Atherosclerosis and Lipid Metabolism*—Daniel Steinberg, M. D., Chief, Section on Metabolism, National Heart Institute, National Institutes of Health.

*Results of Early Studies on Effects of Sleep Deprivation*—David McK. Rioch, M. D., Director, Division of Neuropsychiatry, Walter Reed Army Institute of Research.

*A Hearing Evaluation of an Air Force Squadron of Jet Aircraft Maintenance Personnel*—Capt. R. G. Hansen, USAF (MSC), Wright Air Development Center, Wright-Patterson Air Force Base.

## Wednesday Morning, 14 November

Presiding: William S. Middleton, M. D., Chief Medical Director, Veterans Administration.

*Neurological Complications of Spinal Anesthesia*—Myron J. Levin, M. D., Clinical Professor of Anesthesia, University of Illinois College of Medicine, Chicago, Ill.; Assistant Chief, Anesthesia Section, Veterans Administration Hospital, Illinois, Ill.

*Radiation Control Problems Aboard Nuclear Submarines*—Lt. Comdr. John H. Ebersole, MC, USN, Medical Officer, U. S. S. *Seawolf* (SSN 575).

*Clotting Factor Abnormalities in Chronic Liver Disease*—Joseph R. Goodman, Ph. D., Head, Physiological Research Unit, Medical Research Program, Veterans Administration Hospital, Long Beach, Calif.; Research Associate, Department of Biochemistry and Nutrition, University of Southern California Medical School, Los Angeles, Calif.

*The Wholesomeness of Irradiated Food and Its Military Implications*—Col. Tyron E. Huber, MC, USA, Research and Development Division, Office of the Surgeon General, Department of the Army.

*Practical Application of Pulmonary Physiology for Small Hospitals*—Maj. Robert B. Stonehill, USAF (MC), Chief of Pulmonary Disease Section, Lackland Air Force Hospital.

## Wednesday Afternoon

Presiding: David E. Price, M. D., Assistant Surgeon General, U. S. Public Health Service, Department of Health, Education, and Welfare.

*Future Trends in Military Aviation Medicine*—Capt. Ashton Graybiel, MC, USN, Director of Research, School of Aviation Medicine, Naval Air Station, Pensacola, Fla.

*Experiences in Evacuation of Severely Burned Patients*—Lt. Col. Robert D. Pillsbury, MC, USA, Deputy Commander, Surgical Research Unit, Brooke Army Medical Center.

*The Effect of Thyroid Ablation Upon Serum Cholesterol and  $\beta$ -Lipoprotein Spectrum*—Joseph R. Goodman, Ph. D., Head, Physiological Research Unit, Investigative Medicine Service, Veterans Administration Hospital, Long Beach, Calif.; Research Associate in Biochemistry, University of California Medical School, Los Angeles, Calif.

*Nurse Anesthetist Refresher Course*—Capt. Richard J. Ward, USAF (MC), 7100th U. S. Air Force Hospital, Wiesbaden, Germany.

*Medical Education for National Defense*—Col. Sheldon S. Brownston, USAF (MC), Director of Staff, Office of Secretary of Defense (Health and Medical).

*The Tranquilizing Drugs*—Edward V. Evans, M. D., Acting Chief, Laboratory of Clinical Sciences, National Institute of Mental Health, National Institutes of Health.

*Effects of Microwaves: Current and Proposed Research*—Maj. Daniel B. Williams, USAF (MC), School of Aviation Medicine, U. S. Air Force, Randolph Air Force Base.



## BOOKS

### Reviews of Recent Books

**BLAKISTON'S NEW GOULD MEDICAL DICTIONARY**, A modern comprehensive dictionary of the terms used in all branches of medicine and allied sciences, including medical physics and chemistry, dentistry, pharmacy, nursing, veterinary medicine, zoology and botany, as well as medicolegal terms, edited by *Normand L. Hoerr, M. D.*, and *Arthur Osol, Ph. D.*, with the cooperation of an editorial board and 88 contributors. 2d edition. 1,463 pages; 252 illustrations on 45 plates, 129 in color. The Blakiston Division, McGraw-Hill Book Co., Inc., New York, N. Y., 1956. Price \$11.50.

Here is the dictionary that medical writers and editors have been waiting for. Compiled by a distinguished editorial board and 88 eminent and authoritative contributors in specialized fields, this completely revised and enlarged new edition has kept pace with our ever-growing, rapidly changing, current medical and surgical language. Thousands of new entries (some 12,000), changes (8,000), and modernization of spellings and usage are incorporated; and obsolete and unused terms have been deleted. Recognition of usage was a determining factor in selection. With the exception of the tables on diet and veterinary doses, the same helpful tables and lists, some revised, comprise the appendix; the color plates and halftone illustrations remain as in the first edition. A new table on radioactive and other isotopes commonly used in medicine has been added.

*Definitions are concise, clear, accurate. Pronunciation is simplified by syllable division and accent and, when necessary, by phonetic respelling. A convenient key to the respellings acts as a helpful, easy guide.*

Rapid finding of any term is facilitated by clear italic, roman, and boldface type. When series of subentries follow main entries they have been set in indented columnar form and each item set off in boldface type.

Altogether, the practitioner, student, medical author and editor, and all others concerned with medicine and the allied fields will appreciate this practical, helpful, and discriminating work.—*E. W. MARTIN*

**CLINICAL LABORATORY DIAGNOSIS**, by *Samuel A. Levinson, M. S., M. D., Ph. D.*, and *Robert P. MacFate, Ch. E., M. S., Ph. D.* 5th edition. 1,246 pages; 244 illustrations and 13 plates, 11 in color. Lea & Febiger, Philadelphia, Pa., 1956. Price \$12.50.

Five years have elapsed since the last edition of this standard and highly regarded text in clinical pathology. It has been revised, enlarged by 100 pages, and brought up to date. However, the number and titles of the chapters are identical with the previous edition.

The entire chapter on hematology has been revised to include current knowledge of hemorrhagic diseases, anemias, and leukemias. Newer knowledge concerning hemoglobin components along with the use of paper electrophoresis in the analysis of these components is presented. The entire section on hematology is particularly well done. The section on chemistry includes new microchemical methods, additional spectrophotometric analyses, and the spectrum analysis of hemoglobin derivatives, as well as a new discussion on electrolyte balance studies. There is an adequate discussion of blood groups, Rh factor, and the Coombs' test, but the section on blood bank procedures is very brief for this extremely important phase of laboratory work. The reader is referred to the standard texts and reference manuals for details of these procedures. The methods for the performance of the Venereal Disease Research Laboratory slide and tube flocculation tests are included in the chapter on immunology and serology. There is even a brief discussion of the *Treponema pallidum* immobilization test. The chapter on bacteriology has been rewritten with the addition of the method for the determination of the antistreptolysin titer of sera and other new techniques. Modifications and improvements have been made in the chapters on tropical diseases and histologic technique. The section on legal medicine and toxicology is an excellent review or introduction to this special field. There is an adequate index as well as a table referring the reader to the proper page for important laboratory tests in the common diseases.

The authors have attempted to bring together in a single volume all the many phases of clinical pathology. They have achieved this objective in discussing the most useful methods of laboratory medicine in a systematic, concise manner. The book is well printed with numerous excellent illustrations. It is highly recommended to the medical student, medical technologist, practicing physician, and pathologist as an authoritative text in clinical laboratory methods.

—MILWARD W. BAYLISS, Col., MC, USA

DISEASES OF THE SKIN, by Richard L. Sutton, Jr., A. M., M. D., F. R. S. (Edin.). 11th edition. 1,479 pages; 1,972 illustrations. The C. V. Mosby Co., St. Louis, Mo., 1956. Price \$29.50.

The 11th edition of this standard textbook of dermatology is a worthy successor to the previous editions. During the 13 years since this book was last reprinted and emended, many advances have been made in the specialty, and the author has successfully noted and included in this work these additions. The author has been peculiarly successful in adding to the book hundreds of photographs, many more pertinent subjects and improved discussions. This edition is written more as an outline than previous ones, some subjects having been cut considerably, yet have been treated more precisely and informatively than before. The photographs are superb. The author has added the more recent therapeutic advances in pertinent portions of his text. ACTH, cortisone, and hydrocortisone are discussed, and their uses outlined. There

## BOOKS

### Reviews of Recent Books

**BLAKISTON'S NEW GOULD MEDICAL DICTIONARY**, A modern comprehensive dictionary of the terms used in all branches of medicine and allied sciences, including medical physics and chemistry, dentistry, pharmacy, nursing, veterinary medicine, zoology and botany, as well as medicolegal terms, edited by *Normand L. Hoerr, M. D.*, and *Arthur Osol, Ph. D.*, with the cooperation of an editorial board and 88 contributors. 2d edition. 1,463 pages; 252 illustrations on 45 plates, 129 in color. The Blakiston Division, McGraw-Hill Book Co., Inc., New York, N. Y., 1956. Price \$11.50.

Here is the dictionary that medical writers and editors have been waiting for. Compiled by a distinguished editorial board and 88 eminent and authoritative contributors in specialized fields, this completely revised and enlarged new edition has kept pace with our ever-growing, rapidly changing, current medical and surgical language. Thousands of new entries (some 12,000), changes (8,000), and modernization of spellings and usage are incorporated; and obsolete and unused terms have been deleted. Recognition of usage was a determining factor in selection. With the exception of the tables on diet and veterinary doses, the same helpful tables and lists, some revised, comprise the appendix; the color plates and halftone illustrations remain as in the first edition. A new table on radioactive and other isotopes commonly used in medicine has been added.

Definitions are concise, clear, accurate. Pronunciation is simplified by syllable division and accent and, when necessary, by phonetic respelling. A convenient key to the respellings acts as a helpful, easy guide.

Rapid finding of any term is facilitated by clear italic, roman, and boldface type. When series of subentries follow main entries they have been set in indented columnar form and each item set off in boldface type.

Altogether, the practitioner, student, medical author and editor, and all others concerned with medicine and the allied fields will appreciate this practical, helpful, and discriminating work.—E. W. MARTIN

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diagnostic, and therapeutic aspects of diseases of the skin. It is a brief, practical, and useful text for the student and practitioner.

The book is well illustrated with both black and white and colored plates, and the printing is excellent. Organization of the subject matter is practical and useful. Particularly helpful to the nonspecialist is the section included in each chapter on those aspects of nursing that are particularly germane to the diseases considered.

The chapter on general therapeutic suggestions will prove to be a most helpful guide to the beginner.

Dr. Tobias again has succeeded in presenting a wide and difficult subject in a concise and readable form, yet complete enough for everyday use. This book is highly recommended for students of medicine and the nonspecialist.—VICTOR R. HIRSCHMANN, Col., MC, USA

**WORLD-ATLAS OF EPIDEMIC DISEASES**, Part II, Fourth Issue, edited under the Sponsorship of the Heidelberger Akademie der Wissenschaften by Professor Dr. med. Ernst Rodenwaldt, Heidelberg, in Collaboration with Privatdozent Dr. med. habil. Helmut J. Jusat, Heidelberg. 36 pages; 11 colored maps. Falk-Verlag, Hamburg 1, Germany, 1936. Price 32 Deutsche marks, plus extra charge for postage and packing.

Any attempt, such as this book makes, to portray African diseases in their entirety in so many diversely governed, seminomadic peoples living under such a variety of climatic and social conditions is bound to leave the student with a feeling of uncertainty. However, such comprehensive coverage will certainly serve as a very fine basis for future studies and evaluation of reports from these areas. Plague, leprosy, poliomyelitis, and smallpox are discussed in detail, and the great gaps in information are clearly stated in the text. The maps, as usual with this series, are detailed and contain data oriented as to time and place, but not as clearly as to race. The text clarifies the map presentations, but careful interpretation is required.

In discussing plague, it was noted that the gigantic wave between 1920 and 1930 carried the series of yearly and seasonal waves to a high crest. No explanation for this large wave was attempted, but it may help explain many baffling facts about plague in this and other areas.

Leprosy and its relationship to tuberculosis, diet, poor sanitation, migration, climate, living conditions, and customs are discussed, but no over-all panaceas are proposed. The changing picture of leprosy in Africa since 1900 and the conclusion, attributed to many authorities, that the total incidence is declining may be misleading. This problem is apparently still very great.

There are five fine climatologic maps of Africa that give fairly detailed data on January and July temperatures, total yearly precipitation in the rainy and dry seasons, and a map of thermal suitability values (range of comfort)—all of which are of great value in considering the ecology of disease.—GOTTLIEB L. ORTH, Col., MC, USA

- A TEXTBOOK OF OPERATIVE DENTISTRY, by William H. O. McGehee, D. D. S., M. D., F. A. C. D., Harry A. True, D. D. S., F. A. C. D., and E. Frank Inskip, D. D. S., F. A. C. D. 4th edition. 720 pages; illustrated. The Blakiston Division, McGraw-Hill Book Co., Inc., New York, N. Y., 1956. Price \$14.

This is the latest edition of a text that has been standard in its field since 1930. It presents the subject as completely as can be expected in one volume. The first two editions were authored by Doctor McGehee alone, he was joined by the named co-authors for the third edition, and the present edition lists 20 other contributors.

This is a thoroughly modern textbook. Narrative and outline forms of presentation are admirably blended to permit the inclusion of much material without increasing the difficulty of productive study. The 423 figures contain many hundreds of individual illustrations, plus figures from earlier editions. The use of new high-speed materials and techniques is presented in a chapter entitled "Accuracy with Speed." In addition to the expected chapters dealing with dental cavities, cavity form, cavity preparation, instrumentation, and filling materials, there are chapters discussing such subjects as efficiency in the arrangement of the dental office and the role of the dental assistant in operative dentistry. Endodontics is presented in a separate chapter, and there is a 93-page chapter on operative dentistry for children, authored by Charles A. Sweet, Sr., and I. Irwin Beechen. As in earlier editions, the importance of adequate diagnosis as a requisite to adequate restorative dentistry is stressed.

The material is both well organized and comprehensively treated; subjects are readily discoverable in the index, easily located in the text, and clearly and concisely presented. This volume can be recommended to both students and practicing dentists.

—JAMES E. CHIPPS, Lt. Col., DC, USA

- NEW AND NONOFFICIAL REMEDIES 1956, Containing Descriptions of Drugs Evaluated by the Council on Pharmacy and Chemistry of the American Medical Association. An Annual Publication Issued Under the Direction and Supervision of the Council. 540 pages; illustrated. J. B. Lippincott Co., Philadelphia, Pa., 1956. Price \$3.35.

This annual publication of the Council on Pharmacy and Chemistry of the American Medical Association describes drugs, arranged according to their pharmacologic action or clinical use, that have been evaluated by the Council but have not been included in the *Pharmacopeia of the United States*, *The National Formulary*, or, for a prior cumulative 20-year period, in previous *New and Nonofficial Remedies* (NNR). The scope of the book was expanded this year to include not only established useful drugs but also information on all available new drugs. As a result 60 monographs on new drugs were added this year, while only seven from last year's NNR were omitted.

Drugs are described under nonproprietary titles with their chemical or biologic identity, including their actions, uses, side effects, to

city, dosage, and routes of administration. Names of commercial preparations are listed after each monograph.

The general index at the end of the book lists the drugs by their commercial as well as their nonproprietary names.

This volume serves the purpose for which published: to give pertinent and reliable information on new and nonofficial remedies and thereby to encourage rational therapy.—PATRICK I. McSHANE, Col., MC, USA

**TEXTBOOK OF MEDICAL PHYSIOLOGY**, by Arthur C. Guyton, M. D. 1,030 pages; illustrated. W. B. Saunders Co., Philadelphia, Pa., 1956. Price \$13.50.

This textbook is written primarily for students and is not a reference work. The author's stated intent is to present the philosophy and logic of the mass of knowledge needed by the physiologist and physician. He has accomplished this goal for the medical student by blending enough anatomy and pathology to stimulate the student's interest in the practical aspects of physiology. However, for the physiology student there is too little emphasis on basic mechanisms and the underlying biophysical principles involved. There is only an occasional use of mathematical models, which in many cases can cleverly and simply define a complicated process.

The book consists of 11 major subdivisions and 75 chapters. The subdivisions follow classical lines, i. e., respiration, neurophysiology, circulation, et cetera. The physiologic aspects of aviation, deep-sea diving, and nuclear radiation are covered in special sections but are very brief. There are several misstatements in a short discussion of the "effects of the atom bomb blast on the body."

At the end of each topic a carefully selected bibliography is included. These references were selected for their own broad bibliographies as well as for their individual value and are exceedingly helpful.

In spite of the above limitations, this is a very readable book which will provide anyone interested in human biology with a readily understandable general review.—JAMES B. HARTGERING, Lt. Col., MC, USA

**YEAR BOOK OF DERMATOLOGY AND SYPHILOLOGY (1955-1956 Series)**, by Rudolf L. Baer, M. D., and Victor H. Witten, M. D. 480 pages; illustrated. The Year Book Publishers, Inc., Chicago, Ill., 1956. Price \$6.50.

This yearbook contains nearly 400 abstracts of articles received by the editors from December 1954 through November 1955. It has the same format and table of contents as previous editions and has an original article by the authors on therapy with superficial x-rays and Grenz rays. Many foreign articles are abstracted. Some abstracts are rather long and could be shortened to make room for summaries of additional articles. The editors emphasize the current studies on cutaneous enzymes and lipid metabolism, and new information is presented on the relationship of skin diseases and systemic involvement.

Acanthosis nigricans, incontinentia pigmenti, and acrodermatitis atrophicans are currently receiving much attention. Psoriasis, the ubiquitous enigma, is at long last receiving much therapeutic and biochemical investigation.

The abstracts on therapy are useful. Of interest are those on the use of ACTH, cortisone, and hydrocortisone. Various forms of radiation therapy for dermatoses are presented. The forms of radiation such as high-energy electrons and soft radiation from beryllium window tubes may prove of particular value, being highly effective on skin lesions and having little effect on the underlying tissues.

Dermatology needs a good cumulative index. Until one is produced, however, the yearbooks will provide a good working basis for the researcher as well as a general review source.

—WILLIAM N. NEW, Capt., MC, USN

OF WATER, SALT AND LIFE, an atlas of 36 pages illustrating 31 color plates, prepared and distributed by Lakeside Laboratories, Inc., Milwaukee, Wis., 1956.

This little book is a beautifully illustrated atlas of fluid and electrolyte balance in health and disease. It consists of 31 colored plates opposite short descriptions of such topics as acid-base balance, pharmacology of diuresis, congestive heart failure, cirrhosis, nephrosis, et cetera. Although some figures require a certain amount of concentration the book does present the feeling of dynamic processes. It should prove to be a valuable aid both to students and to practitioners who may deal with "water, salt, and life."—S. O. WAIFE, Lt. Comdr., MC, USNR

DISEASES OF THE ENDOCRINE GLANDS, by Louis J. Soffer, M. D., with J. Lester Gabrielove, M. D., and the Section on Gonads by Arthur R. Sobval, M. D. 2d edition. 1,032 pages; 102 illustrations and 3 plates in color; 28 tables. Lea & Febiger, Philadelphia, Pa., 1956. Price \$16.50.

The author discusses the diseases of endocrine glands in separate sections for each gland or, in a few cases, two glands. Reviews of anatomy, embryology, and physiology, which precede the clinical descriptions in each section, contain the details essential for complete understanding of clinically recognizable disease. The chapter on carbohydrate metabolism and diabetes mellitus, included in the first edition, has been excluded from this edition.

Many case reports are advantageously used to amplify the author's descriptions of diseases. The illustrations are clear and adequate, except for a paucity of pictures of patients. Greater use of structural chemical formulas and of tables to bring out similarities of, and differences between, various products of one endocrine gland could add to the value of future editions.

The clarity of presentation makes for easy reading and understanding. The author has, indeed, struck an excellent balance between space allotted to theory and to practice. The endocrinologist interested in the



historical development of our knowledge is unlikely to turn to this book, which is, however, excellently suited to the needs of other physicians.

Because the book is truly up to date in most respects, it was disappointing to read only of the intramuscular corticotropin-eosinophil test for adrenal cortical insufficiency in the section on Addison's disease. Reference is made to Thorn's work, published in 1948. In the appendix, tests using intravenous and intramuscular injection of ACTH are described. However, even there the limitations of the intramuscular injection technic are not discussed.

The appendix (which is devoted to laboratory tests of endocrine function) should be useful to most readers. It could be improved by clarifying the arrangement of order of the tests, perhaps by the use of a preliminary outline or by the use of headings.

In summary, this book can be recommended to general practitioners, internists, and specialists other than endocrinologists as a volume which combines discussions of physiology and disease, theory and practice, and clinical and laboratory aspects in optimum proportions.

—ROBERT J. HOAGLAND, Col., MC, USA

ADVANCES IN VETERINARY SCIENCE, Volume II, edited by C. A. Brandy and E. L. Jungherr, 449 pages; illustrated, Academic Press, Inc., Publishers, New York, N. Y., 1955. Price \$10.

This volume continues the approach made in 1953 in Volume I directed toward the periodic review of progress in the more active fields of research pertinent to veterinary medical science. The editors have had the benefit of a distinguished advisory board in the review and editing of the 11 individual contributions comprising the volume.

The subjects discussed are epizootiology of virus diseases, mycoses in animals, respiratory diseases of poultry, the blood groups of animals, disease caused by deficiencies of trace elements, photosensitization in animals, rumen dysfunction, bovine keratosis, tickborne rickettsioses in South Africa, vibriosis, and effective control of internal parasites.

Each subject is followed by a bibliography. The value of this work is further enhanced by complete author and subject indexes at the back of the volume.

The reviewer inevitably finds himself more interested in some of the areas concerned than in others. Likewise, the differences in approach by the several contributors are pronounced. These range from almost pedantic undergraduate-level abstracts of the literature to extraordinarily thought-provoking interpretations and estimations of the significance of the newly uncovered findings of veterinary and medical research.

The reviewer has seldom encountered a more fascinating and stimulating paper than the contributions on the epizootiology of virus diseases by R. E. Shope. This alone is sufficient to merit the inclusion

of the volume in the libraries of all interested in infectious disease and in veterinary medicine.

In like manner, the discussion of the blood groups of animals by L. C. Ferguson not only merits careful reading but further serves as a ready reference for valuable techniques and methodology.

The editors, the advisory board, and the individual contributors have admirably met their objective of producing a volume "of greatest use to the serious student, the research worker, and the practitioner (of veterinary medicine)." This volume should be required reading for all veterinarians of the armed services.

—WILLIAM S. GOCHENOUR, Jr., Lt. Col., VC, USA

CAUSAL FACTORS IN CANCER OF THE LUNG, by Carl V. Weller, M. S., M. D. American Lecture Series, Publication No. 277, A Monograph in American Lectures in Chest Diseases, edited by J. Arthur Myers, M. D., Ph. D. 113 pages; illustrated. Charles C Thomas, Publisher, Springfield, Ill., 1956. Price \$3.

Regardless of the time available, it is the dream of every lecturer to be permitted an additional 15 minutes to devote to his subject. The Charles C Thomas Company has done just this in a number of monographs called the "American Lecture Series." Outstanding authorities have been allowed to revise, expand, and annotate their most popular lectures. These have been published and, despite the variety of subjects and of authors, have generally maintained a very high quality. Strangely, the publishers "do not have a completely up-to-date list of The American Lecture Series." To the reviewer this seems a pity. Those volumes of the series which he has examined in the past have been worth owning.

The present volume is typical of this series. The lecture has been expanded to a monograph, supplemented by 121 carefully and well-chosen references. Following a discussion of general considerations, Dr. Weller develops in detail a first theme describing bronchogenic carcinoma as an endemic occupational disease in miners, a second theme describing the search for causes of cancer of the lung in the 20th century, and a third theme concerned with the relation between tobacco smoking and bronchogenic carcinoma.

Although the subject of the lecture is sharply limited, the material is presented in an interesting and even exciting manner. The author has accomplished his objective, which was to explore the "causes, intrinsic and extrinsic, proved and suspected, of bronchogenic cancer." The type and engravings are of high quality, the binding is leatherette, and the volume is handsome in appearance. It is recommended as a valuable addition in any general library and to physicians and workers with a special interest in this field. For those who may have to lecture on this subject, this monograph would be of considerable value.

—ARTHUR STEER, Lt. Col., MC, USA

**CURRENT THERAPY, 1956**, Latest Approved Methods of Treatment for the Practicing Physician, edited by *Howard F. Conn, M. D.* and 12 consulting editors. 632 pages. W. B. Saunders Co., Philadelphia, Pa., 1956. Price \$11.

This is the eighth edition of this compendium of therapy which fortunately has resisted the expansion in bulk which usually occurs with medical books from edition to edition. The contributors are selected from recognized authorities who are especially interested in the specific disease discussed. They vary with the edition and consequently new viewpoints are given. The outlines of therapy are brief and practical, and treatment methods found useful in the past are not discarded if still effective, although obsolete methods of treatment are omitted.

There is a multitude of new drugs available and those well tried are included; experimental drugs are not included, and note is made when treatment methods not fully tested are given.

At times two different methods of approaching treatment are noted, either of which might be followed successfully or from which the reader might evolve a third of his own, proving that medicine as an art is not yet dead.

This book is a useful desk reference, brief and to the point, which gives the essentials of therapy of each disease and the most up-to-date methods and drugs, and which prevents one's missing some new aspect of treatment.—*JAMES L. TOBIN, Col., USAF (MC)*

**THERAPEUTIC USE OF ARTIFICIAL RADIOISOTOPES**, edited by *Paul F. Hahn, Ph. D.* 414 pages; illustrated. John Wiley & Sons, Inc., New York, N. Y., 1956. Price \$10.

This 400-page volume represents a compilation of 29 research men's experience in the use of isotopes over a 20-year period. The editor's choice of authors seems for the most part to reflect his philosophy of being more forthright and willing to take some scientific risks in incurable patients in order to more fully understand the capabilities of these medical tools. He feels irradiation is a therapeutic weapon and is not the panacea to the cancer problem. He proceeds to show the results of thorough scientific research in an inspiring and challenging way.

The order of presentation of chapters is excellent. Prefacing the individual uses of isotopes is a section including a short history of the use of radioisotopes, the problems facing even the most astute scientist in using them, their procurement and safe handling, and their effects on tissue. Within these first chapters is an effective blending of doctors of medicine and doctors of other scientific fields. Chapters 2 and 3 might be disconcerting to the novice in this field, and possibly keep him from finishing the book. Yet the subjects of radiologic physics and dosimetry of internal radioisotopes are concisely presented, and by carefully studying these chapters a wide knowledge can be gained in a short time. The procurement of isotopes has been brought

up to date with the addendum to chapter 4. The work by Hymer L. Friedell and P. R. Saletno as reviewed in chapter 6 presents a challenge to all those working in this broad field. Radiation effect is little enough understood, let alone the effect of multiple types of radiation. These men outline methods of research into the synergistic effect of isotopes used in combination that would be well used by others in studying this most urgent problem. Edwin E. Osgood's chapter on the treatment of leukemias and polycythemia vera with radioactive phosphorus is a splendid review of a method of treating the complete patient. The basic histophysiology upon which this treatment is based has been well investigated by the author, and the complete way in which he outlines his course of therapy is excellent. The work by Osgood, Tivey Seaman, et al. is classical. The next chapter also deals with investigative methods for treatment of chronic leukemias, presenting case histories to highlight questions as to mode of action of radiation, problems faced during treatment, and choice of isotopes in treating this disease state.

Chapter 9 is an excellent review of the use of radioiodine in thyrotoxicosis and a brief note on its use in cardiac disease. Chapter 10, on treatment of thyroid carcinoma, is on clinical selection of patients, methods of use of iodine, dosimetry of radiation within the body, complications, a summary of what the author thinks is reasonable management of treatment, and safeguards for the patients and personnel.

The next seven chapters deal with specific colloids, applicators, and implants of isotopes within or on the body in attempts to ablate or palliate cancerous tumors. These chapters have been written by specialists in each field and represent the most advanced knowledge on these subjects. The last chapter, written by G. H. Fletcher, is a concise summary of this man's thought on the advantages and disadvantages of this method of treatment. The book is invaluable to specialist and general practitioner as a guide and review of what has been done in this field.—*RICHARD E. OGBORN, Maj., MC, USA*

THE MEDICAL DEPARTMENT OF THE UNITED STATES ARMY. Surgery in World War II. Hand Surgery, edited by Sterling Bunnell, M. D. 447 pages; illustrated. Prepared in the Historical Unit, Army Medical Service, under the direction of Colonel Calvin H. Goddard, MC, AUS. Editor-in-Chief, Colonel John Boyd Coates, Jr., MC, USA; Associate Editor for Hand Surgery, Mary E. McDonald; Assistant Editor, Janie W. Williams. Office of the Surgeon General, Department of the Army, Washington, D. C., 1955. For sale by the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C. Price \$3.50.

This volume is both a historical document and a report of a clinically important collective experience in the management of the injured hand. Although the format of *résumés* of experiences in the individual theaters of operation and hand centers results in considerable repetition, the basic principles of hand surgery are so unanimously and emphatically emphasized that their importance cannot be missed.

The book is well illustrated with photographs, sketches, and photographic copies of roentgenograms which are usually well placed to conform with the text. Many of the illustrations, however, are so reduced in size that their value is lost—this is particularly true of the roentgenograms.

The influence of the editor, as one of the pioneers in the field of hand surgery and as Civilian Consultant for Hand Surgery to the Secretary of War, is felt throughout the book. Chapter 2—consisting of his conclusions based on his experiences as consultant—is a highly concentrated digest of the principles and details of management of the injured hand, but as such might better have been placed at the end so that he could have commented on some of the differences in approach or viewpoint of the various contributors.

Many important lessons can be learned from this book. It is apparent that hand surgery is an important part of any mass casualty situation and that proper care of the injured hand begins in the field. The need for specialized centers staffed by trained and interested personnel is stressed. This is particularly true in the reconstructive phase of hand surgery.

This book is an important contribution to the field of the surgery of trauma. Based on a wide experience, it is a source of general and specific information on all phases of the management of the injured hand. It should be an invaluable addition to the library of the military and industrial surgeon.—HASKELL M. WERTHEIMER, *Comdr., MC, USN*

**EPITOME of the Pharmacopoeia of the United States and the National Formulary with Comments.** Issued under the Direction and Supervision of the Council on Pharmacy and Chemistry of the *American Medical Association*. 10th edition. 322 pages. J. B. Lippincott Co., Philadelphia, Pa., 1955. Price \$3.

For the benefit of those not familiar with this volume, it is designed to follow the material published in the *Pharmacopoeia of the United States* and the *National Formulary*, but to present it in such a form that it will be more valuable to physicians. The two volumes mentioned provide the standards for drugs and drug preparations; however, they also contain much detail that is of value to the pharmacist or drug manufacturer but is of little interest to physicians.

The present edition, of convenient size as to make its ready reference inviting, contains only the essential definitions and descriptions of the drugs listed, with more detail as to the nature of the remedies, their uses and doses. Adverse comment is made on preparations believed to be of doubtful value; however, the wisdom of this is questioned in view of the great deliberation which goes into the acceptance of drugs for the official volumes.

The items are arranged alphabetically by their English names, the uses of which are of particular interest to the prescribing physician,

as is the information relative to market preparations in which the drugs may be found.

Some of the words of caution found in the official volumes are omitted from this volume. This point is of little importance in those cases where the "caution" was directed at the manufacturer or the dispenser. However, in those cases where the words of caution were of prime importance to the physician prescribing the medicines, their omission could possibly have a disastrous effect.

The reference tables are a handy aid, and the organization is well planned. The volume should prove to be a valuable adjunct to the physician's desk or library.—ELWOOD M. WRIGHT, Col., MSC, USA

THE MEDICAL DEPARTMENT OF THE UNITED STATES ARMY. *Vascular Surgery in World War II*, edited by Daniel C. Elkin, M. D., and Michael E. DeBakey, M. D. 465 pages; illustrated. Prepared in the Historical Unit, Army Medical Service, under the direction of Colonel Calvin H. Goddard, MC, AUS. Editor-in-Chief, Colonel John Boyd Coates, Jr., MC, USA, Office of the Surgeon General, Department of the Army, Washington, D. C., 1955. For sale by the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C. Price \$4.25.

This volume of the medical history of World War II gives a detailed accounting of complications of traumatic vascular injuries in casualties evacuated to the zone of interior. In this book is statistically recorded what is probably the largest and certainly the most recent and most complete series of vascular injuries to date. Although primarily of historical and statistical nature, the authors have included diagnostic methods, various tests, surgical approaches and techniques as well as valuable pre- and post-operative physiologic data.

The authors tabulate the expected incidence of gangrene which may follow ligation of major vessels. In doing so, Makins' World War I figures on the subject are clarified as is misleading information in the 1943 Military Surgical Manual relative to the expected incidence of gangrene following ligation.

Care of the patient with traumatic aneurysms and arteriovenous fistulas is fully discussed. Additional space is allotted to the systemic effects of arteriovenous fistulas. Statistical data is presented on the results of obliterative operations for these lesions and the value of reparative surgical intervention is stressed. Along with the discussion on surgery is the consideration for sympathectomy. In addition to this excellent study of traumatic aneurysms and arteriovenous fistulas, the incidence, diagnosis, and treatment of patients in World War II with other peripheral vascular disturbances and vasospastic disorders are presented.

Although most of the material in this volume was published in various medical journals prior to this compilation, it is regrettable that this volume was not available for reference at the beginning of the Korean conflict. While this volume is regarded as particularly valuable for

those doing vascular surgery and especially those in the service during hostilities, it is extremely valuable for the use of all general surgeons who may have occasion to treat the complications of acute vascular injuries.—CARL W. HUGHES, Lt. Col., MC, USA

**MIGRAINE AND PERIODIC HEADACHE**, A Modern Approach to Successful Treatment, by *Nevil Leyton, M. A. (Canab.)*. 2d edition, reprinted. 122 pages. Published by William Heinemann Medical Books, Ltd., London, England, 1954. Distributed by Charles C Thomas, Publisher, Springfield, Ill. Price \$2.50.

This small, 122-page textbook on headache is as fascinating to the reader as a work of fiction. However, it encompasses the leading scientific theories on etiologic mechanisms of headache and includes some concepts new to this reviewer. Detailed points in the history and physical examination are listed on the *differential diagnosis*. In addition, a relatively simple method of tackling the migraine problem is presented. This is long-term treatment with the aim of preventing headaches, lengthening the interval between them, or ameliorating the attacks. In fact, the most commonly prescribed relief remedies are barely mentioned.

The author is certain that there are two factors present in the production of migraine: first, an organic diathesis which enables a second, sensitizing factor to produce the alteration of arterial calibre that causes the intracranial pain. A "trigger mechanism" is necessary to set off the sensitizing factor. This latter may be an overproduction of histamine, the cyclic swing of the estrogenic hormones, or the activation by weather, strain, or chronic disease of a neuralgic syndrome. The "trigger" may be psychologic upset, worry, or fatigue.

Treatment is individualistic and includes the progressive injections of an anterior-pituitary-like hormone, histamine injections, the oral use of prostigmine in progressive courses, and the parenteral administration of Vitamin B<sub>12</sub> as well as the use of several other less effective drugs.

Nineteen selective case histories are presented and discussed to illustrate various types of headaches and responses to therapy. Economic and social considerations are presented. The book has a summary of conclusions and a good bibliography, and is well indexed. Illustrations consist only of tables and schedules of treatment.

This book is highly recommended to all physicians who see and fret with many patients with headaches. It gives a positive approach toward treatment and an optimistic outlook for doctor and patient alike. I cannot evaluate or corroborate the results of treatment by these methods, as there has been only sufficient time since receiving this book to start a few patients on some of the therapies recommended. If others can give relief to 75 per cent of migraine patients as the author does, or even to a smaller percentage, this book will be a most useful reference in managing these recurring minor tragedies of everyday practice.

—HORACE C. GIBSON, Col., MC, USA

THE MEDICAL DEPARTMENT OF THE UNITED STATES ARMY. Preventive Medicine in World War II. Volume II: Environmental Hygiene. 404 pages; illustrated. Prepared in the Historical Unit, Army Medical Service. Editor-in-Chief, Colonel John Boyd Coates, Jr., MC. Editor for Preventive Medicine, Ebbe Curtis Hoff, Ph. D., M. D. Office of the Surgeon General, Department of the Army, Washington, D. C., 1955. For sale by the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C. Price \$3.50.

This volume is one of a series on preventive medicine in the U. S. Army during World War II and records those plans, operations, and activities which modified or controlled the environment for health purposes. The authors have selected from the mass of data available to them those events which highlight the general principles of environmental hygiene and their application under the varying conditions of global warfare. The areas of environmental hygiene covered in this review include: food management, housing, water purification, waste disposal, insect and rodent control, and foreign quarantine. In addition, this volume contains an excellent résumé of the major research developments in preventive medicine during the war, as well as a discussion of the many health problems encountered at the various ports of embarkation.

The result is a concise, well-organized treatise on environmental hygiene as it pertains to a military population during mobilization. It gives the reader a comprehension of the effort, planning, and staffing required of the Medical Department in the successful execution of its mission.

Highly recommended reading for all officers, medical or line, whose present or future responsibilities require a broad knowledge of the means by which military populations are maintained in a state of healthful equilibrium with their environment, it is also recommended for public health officers, graduate students of preventive medicine, civil defense officers, and anyone whose needs require an excellent reference of this type. —HARVEY G. TOUSIGNANT, Lt. Col., USAF (MC)

LAUGHTER AND THE SENSE OF HUMOR, by Edmund Bergler, M. D. 297 pages. Intercontinental Medical Book Corp., New York, N. Y., 1956, in cooperation with Grune & Stratton, Inc., New York, N. Y. Price \$5.

The essence of this entertaining psychoanalytic book is described in the foreword: "The present volume attempts to bring the analytic theory on laughter and wit up to date . . . This book proposes to show that laughter is a necessary and healthy *internal* debunking process and, therefore, a fear-reducing process . . ."

Liberal sprinkled with jokes, bright sayings, and witticisms, the book covers the many theories of humor, and the author presents his own interpretation clearly and forcibly. Although some familiarity with psychiatric concepts (superego, psychic masochism, et cetera) is helpful in appreciating the various points of view expressed, even the non-psychiatrist can find much of interest in this book.

—S. O. WAIFE, Lt. Comdr., MC, USNR



**THORACIC SURGERY FOR PHYSIOTHERAPISTS**, by Gladys M. Storey, S. R. N., F. C. S. P., with a foreword by N. R. Barrett, M. Chir., F. R. C. S. 132 pages; illustrated. J. B. Lippincott Co., Philadelphia, Pa., 1955. Price \$3.

The author of this book provides valuable insights for the student and practicing physical therapist into the conditions which they will encounter and treat in their work. It is a book of basic principles rather than an extensive and detailed study. It offers an understanding of conditions in thoracic surgery which should promote the use of more efficient treatment procedures.

The scope of thoracic surgery has expanded in recent years and now includes the management of many conditions for which, formerly, nothing curative could be attempted. Information on these new techniques and procedures will be found in this book. There is discussion of pulmonary, pleural, cardiac, vascular, pericardial, mediastinal, esophageal, and neurologic conditions.—AGNES P. SNYDER, Lt. Col., AMSC (PT)

**TUMORS OF THE SKIN**, by Herbert Conway, M. S., M. B., M. D., F. A. C. S. A Monograph in The Bannerstone Division of American Lectures in Surgery, edited by Michael E. DeBakey, M. D., and R. Glen Spurling, M. D. Plastic Surgery Division, edited by James Barrett Brown, M. D. 267 pages; 178 figures; 3 plates in color. Charles C Thomas, Publisher, Springfield, Ill., 1956. Price \$13.50.

This monograph is divided into two major sections. The first concerns benign tumors of the skin and the second the malignant tumors of the skin.

Each type of tumor is briefly presented. The discussion is chiefly concerned with clinical characteristics and physical findings, frequency of occurrence, treatment, and follow-up data. Following the discussion of each of the various tumors there is a short bibliography with references as recent as 1954.

Surgical treatment of tumors of the skin is emphasized and there is no attempt made to discuss extensively radiation techniques or other nonsurgical methods of treatment. The book is profusely illustrated with photographs of patients with tumors before and after therapy and with artists' sketches of particular operative techniques. However, the book is not a textbook of surgery. The operative techniques illustrated and discussed are to a large extent detailed to emphasize the application of surgical methods in the removal of skin tumors in locations formerly considered beyond the scope of surgical approach and assigned to nonsurgical methods of therapy.

The arrangement of material in this book and the printing makes it easy to read and to use as a ready reference text. The book should be a valuable addition to the library of interns, residents, and advanced surgeons and should also prove interesting to those in other specialties.

—GEORGE F. PEER, Col., MC, USA

## New Books Received

Books received by the *U. S. Armed Forces Medical Journal* are acknowledged in this department. Those of greatest interest will be reviewed in a later issue.

- POLYSACCHARIDES IN BIOLOGY**, Transactions of the First Conference, April 27, 28, and 29, 1955, Princeton, N. J., edited by *Georg F. Springer*, M. D. 271 pages; illustrated. Josiah Macy, Jr. Foundation, New York, N. Y., 1956. Price \$5.
- PROPRIOCEPTIVE NEUROMUSCULAR FACILITATION**, Patterns and Techniques, by *Margaret Knott*, B. S., and *Dorothy E. Voss*, B. Ed. Illustrations by *Helen Drew*. Foreword by *Sedgwick Mead*, M. D. 135 pages; illustrated. Paul B. Hoeber, Inc., Medical Book Dept. of Harper & Bros., New York, N. Y., 1956. Price \$5.50.
- CLINICAL ORTHOPAEDICS**, No. 7, "Tumors of Bone." This number contains a special third section on "Motorist Injuries and Motorist Safety" by *Jacob Kulowski*, M. D. *Anthony F. DePalma*, Editor-in-Chief. 354 pages; illustrated. J. B. Lippincott Co., Philadelphia, Pa., 1956. Price \$7.50.
- PROCTOLOGY**, by *Harry E. Bacon*, M. D., ScD., LL. D., F. R. S. M. (Lond.), F. A. C. S., F. I. C. S. (Hon.), F. P. C. S. (Hon.), F. J. C. S. (Hon.), F. B. C. S. (Hon.), *Stuart T. Ross*, M. D., F. A. C. S., F. A. P. S., F. I. C. S., and *Porfirio Mayo Recio*, M. D., M. Sc., F. P. C. S., F. I. C. S. 441 pages; 228 illustrations and 5 plates in full color. J. B. Lippincott Co., Philadelphia, Pa., 1956. Price \$10.
- FUNDAMENTALS OF NURSING**, The Humanities and the Sciences in Nursing, by *Elinor V. Fuerst*, R. N., M. A., and *LuVerne Wolff*, R. N., M. A. 592 pages; illustrated. J. B. Lippincott Co., Philadelphia, Pa., 1956. Price \$5.
- PRINCIPLES AND METHODS OF STERILIZATION**, by *John J. Perkins*, M. S. 340 pages; illustrated. Charles C Thomas, Publisher, Springfield, Ill., 1956. Price \$8.
- ULCERS OF THE LEGS**, by *Pedro Piulachs*, M. D. 574 pages; illustrated. Charles C Thomas, Publisher, Springfield, Ill., 1956. Price \$15.50.
- EMOTIONAL HAZARDS IN ANIMALS AND MAN**, by *Howard S. Liddell*, Ph. D. American Lecture Series, Publication Number 299, A Monograph in American Lectures in Objective Psychiatry, edited by *William Horsley Gantt*, M. D. 97 pages. Charles C Thomas, Publisher, Springfield, Ill., 1956. Price \$2.50.
- ESSENTIAL UROLOGY**, by *Fletcher H. Colby*, M. D. 3d edition. 656 pages; illustrated. Williams & Wilkins Co., Baltimore, Md., 1956. Price \$8.
- DERMATOLOGY**, by *Donald M. Pillsbury*, M. A., D. Sc. (Hon.), M. D.; *Walter B. Shelley*, M. D., Ph. D.; and *Albert M. Kligman*, M. D., Ph. D. 1,330 pages; 1,117 illustrations on 564 figures. W. B. Saunders Co., Philadelphia, Pa., 1956. Price \$20.
- A GUIDE FOR PSYCHIATRIC AIDES**, by *Charlotte R. Rodeman*, R. N., B. S., M. Ed. 234 pages. The Macmillan Co., New York, N. Y., 1956.

- PRACTITIONERS' CONFERENCES**, held at the New York Hospital-Cornell Medical Center. Volume 4, edited by *Claude E. Forkner*, M. D. 407 pages; illustrated. Appleton-Century-Crofts, Inc., New York, N. Y., 1956.
- ROENTGEN SIGNS IN CLINICAL DIAGNOSIS**, by *Isadore Meschan*, M. A., M. D., with the assistance of *R. M. F. Farrer-Meschan*, M. B., B. S. 1,058 pages; 2,216 illustrations on 780 figures. W. B. Saunders Co., Philadelphia, Pa., 1956.
- SURGERY FOR GENERAL PRACTICE**, by *Victor Richards*, M. D. 947 pages; 476 illustrations. The C. V. Mosby Co., St. Louis, Mo., 1956. Price \$17.50.
- HUMAN ANATOMY AND PHYSIOLOGY**, by *Nellie D. Millard*, R. N., M. A.; *Barry G. King*, Ph. D.; and *Mary Jane Showers*, R. N., M. S. 4th edition. 593 pages; 315 illustrations with 55 in color. W. B. Saunders Co., Philadelphia, Pa., 1956.
- J. A. M. A. CLINICAL ABSTRACTS OF DIAGNOSIS AND TREATMENT**, 1956, published with the Approval of the Board of Trustees, American Medical Association. 661 pages. Intercontinental Medical Book Corp. with Grune & Stratton, Inc., New York, N. Y., 1956. Price \$5.50.
- PSYCHOPATHY AND DELINQUENCY**, by *William McCord*, Ph. D., and *Joan McCord*, Ed. M. 230 pages. Grune & Stratton, Inc., New York, N. Y., 1956. Price \$6.50.
- STUDIES IN TOPECTONY**, edited by *Nolan D. C. Lewis*, M. D.; *Carney Landis*, Ph. D., D. Sc.; and *H. E. King*, Ph. D. 248 pages. Grune & Stratton, Inc., New York, N. Y., 1956. Price \$6.75.
- NEW BASES OF ELECTROCARDIOGRAPHY**, by *Demetrio Sodi-Pallares*, M. D., with the collaboration of *Royall M. Calder*, M. D. 727 pages; 520 illustrations. The C. V. Mosby Co., St. Louis, Mo., 1956. Price \$18.50.
- CLINICAL UROLOGY FOR GENERAL PRACTICE**, by *Justin J. Cordonnier*, M. D., F. A. C. S. 252 pages; illustrated. The C. V. Mosby Co., St. Louis, Mo., 1956. Price \$6.75.
- VENOUS RETURN**, by *Gerhard A. Brecher*, M. D., Ph. D. 148 pages; illustrated. Grune & Stratton, Inc., New York, N. Y., 1956. Price \$6.75.
- THE SPINE**, *Anatomico-Radiographic Studies, Development and the Cervical Region*, by *Lee A. Hadley*, M. D. 156 pages; illustrated. Charles C Thomas, Publisher, Springfield, Ill., 1956. Price \$6.50.
- THE CLINICAL PSYCHOLOGIST**, by *William A. Hunt*, Ph. D. 206 pages. Charles C Thomas, Publisher, Springfield, Ill., 1956. Price \$5.50.
- NATURAL CHILDBIRTH**, by *H. B. Atlee*, M. D. American Lecture Series, Publication No. 291, A Monograph in American Lectures in Gynecology and Obstetrics, edited by *E. C. Hamblen*, B. S., M. D. 79 pages; illustrated. Charles C Thomas, Publisher, Springfield, Ill., 1956. Price \$2.75.
- MEDICINAL CHEMISTRY**, Volume III, A Series of Reviews prepared under the Auspices of the Division of Medicinal Chemistry of the American Chemical Society, by six authors, edited by *F. F. Blucke* and *R. H. Fox*. 346 pages; illustrated. John Wiley & Sons, Inc., New York, N. Y., 1956. Price \$10.50.
- SOLUTIONS AND DOSAGE**, by *Sara Jamison*, R. N. McGraw-Hill Series in Nursing. *Lucile Petry*, Consulting Editor. 3d edition. The Blakiston Division, McGraw-Hill Book Co., Inc., New York, N. Y., 1956. Price \$3.

# UNITED STATES ARMED FORCES MEDICAL JOURNAL

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*Associate Editors*

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## Monthly Message

In the February 1, 1956 number of the *Canadian Medical Association Journal* there is a thoughtful editorial on "The Integration of Medical Research." I should like to quote its first paragraph:

Like Humpty Dumpty, medicine has undergone considerable fragmentation; many are in agreement that the time has come to attempt to put the pieces together again, but, as in the case of Humpty Dumpty, the task is proving extremely difficult. There is a steady movement still continuing towards increasing the sub-division of medical science into sub-specialties; there is also an increasingly strong movement towards a cross-fertilization of one discipline by others. It is as yet impossible to forecast the eventual outcome of these two processes but there is no doubting the grave concern which exists at the ignorance of so many sub-specialists regarding work in other fields.

Unfortunately the splintering of medicine into smaller and smaller subspecialties continues. This may be all very well but I should like to recall the well-known epigram that the expert or specialist is one who knows more and more about less and less. The true specialist is one who considers the patient as a whole in addition to whatever "special" pathological condition he has. Therefore the last sentence in the above paragraph is particularly worthy of consideration.

*Frank B. Berry*

FRANK B. BERRY, M. D.  
Assistant Secretary of Defense  
(Health and Medical)

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# UNITED STATES ARMED FORCES MEDICAL JOURNAL

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## ETIOLOGIC ASPECTS OF ATHEROSCLEROSIS

HORACE C. GIBSON, *Colonel, MC, USA*

**T**HERE is today a vast mass of theory, clinical experience, and investigative data dealing with atherosclerosis. There have been many opposing views, and data have been interpreted differently. I shall try to discuss briefly the more pertinent phases of the problem.

Atherosclerosis is civilized man's greatest killer. Although it has been demonstrated literally from the "cradle to the grave," it takes its greatest toll during middle age—broadly, in men from 40 to 60 years of age and in women from 50 to 70. There is no method of ante-mortem diagnosis before near-total or total closure of an artery, usually a coronary. The emphasis in research is on finding some reliable laboratory methods to tell us which individual is imminently prone to a major catastrophe resulting from the rapid development of atherosclerosis. This goal has not been reached, and, what is more disheartening, the development of successful treatment appears to be as slow and as fraught with pitfalls as methods of diagnosis. Advances, however, are being made in both diagnosis and treatment.

The fine work of Gofman and associates<sup>1</sup> on the mechanism of atherosclerosis, presented in 1950, was of such importance that the United States Public Health Service organized a controlled study of the problem. Page<sup>2</sup> describes how four laboratories—Berkeley (Gofman and Jones), Pittsburgh (Laufer, Hanig, and Barach), Boston (Stare and Mann), and Cleveland (Lewis and Page)—were designated, and work started in the winter of 1950. More than a year was required before the centrifuge analyses and cholesterol measurements agreed sufficiently among these labor-

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From U. S. Army Hospital, Fort Jackson, S. C.



## Foreword

The *United States Armed Forces Medical Journal* is the medium for disseminating information of administrative and professional interest to all medical personnel of the Department of Defense. The Assistant Secretary of Defense (Health and Medical) and the Surgeons General of the several services invite all medical officers, dental officers, Medical Service Corps officers, Nurse Corps officers, and officers of the Veterinary Corps of the Armed Forces, and the medical consultants of the Army, Navy, and Air Force to submit manuscripts for publication in this journal.

FRANK D. DERRY, M. D.,  
*Assistant Secretary of Defense (Health and Medical).*

MAJOR GENERAL SILAS B. HAYS,  
*Surgeon General, United States Army.*

REAR ADMIRAL BARTHOLOMEW W. HOGAN,  
*Surgeon General, United States Navy.*

MAJOR GENERAL DAN C. OGLE,  
*Surgeon General, United States Air Force.*

Neither cholesterol nor the other lipids, phospholipid and neutral fat, exist in plasma as pure substances. Lipids are the only large class of vital substances insoluble in water. They are bound to protein in the form of complex lipoprotein molecules. These compounds of lipoproteins contain different proportions of cholesterol, phospholipid, triglycerides, and protein. Electrophoretic or chemical technics separate them grossly into alpha and beta lipoproteins. Ultracentrifugal analysis results in a classification of high- and low-density lipoproteins of varying  $S_f$ .

The low-density lipoproteins are considered to be the beta lipoproteins of chemical analysis, and abnormally high values of these are found in clinical heart disease. The high-density, smaller lipoproteins are considered to be alpha lipoproteins, although the precise relationship has not been clarified.<sup>3</sup> Lipoproteins serve as important vehicles for lipids, certain vitamins, and probably hormones.<sup>3</sup>

The average laboratory can determine a total serum cholesterol: This is of significant help if done on a fasting specimen. Although this tells us nothing of the low-density or beta lipoprotein levels, there is fair correlation of high cholesterol levels in atherosclerosis, the usual cause of coronary heart disease. The more elaborate methods of study are extremely expensive. The electrically driven analytic ultracentrifuge which uses an optical and photographic system costs about \$18,000. The maintenance costs on it are very great, and its operation requires a full-time technical staff of two persons. Some attempts have been made to get more accurate results in the separation of the lipoprotein fractions by using the differential preparative machine for separating out the various density lipids, and then running phospholipid, cholesterol, and neutral fat determinations on each of these fractions as well as on the whole serum. There is a prodigious amount of work to be done experimentally before any possible short cuts can be developed. The machine in this case costs only \$5,000.<sup>4</sup>

The hyperlipemia of nephrosis as well as of some other diseases is dependent on a metabolic disorder which involves protein as well as lipid. Page suggests that a defect in the synthesis or degradation of the protein moiety of the lipoproteins might be at fault, and that this possible defective protein metabolism may be as important as defective lipid metabolism in atherogenesis.

#### "FILTRATION" THEORY

The arterics are respiring, pulsating musculo-fibrous tubes. The arterial tissue uses oxygen and nourishment and is supplied by vasa vasorum—numerous small arteries distributed to the outer fibrous and elastic layer (tunica externa) and to the tunica media, the muscular layer. The blood is returned by small venae vasorum from the same layers. The inner layer, or tunica intima,

stories. Next, the serum of 12,000 normal people was studied, and each year since a follow-up has been made to determine whether myocardial infarction or other evident vascular disease has developed. These data are now undergoing statistical treatment in Washington. The first results are expected to be published sometime this year.<sup>1</sup>

In essence, Gofman's working hypothesis of lipoprotein interconversions is that a certain class of lipoproteins, *i. e.*, those with serum flotation ( $S_f$ ) rates between 12 and 20 Svedberg units, are atherogenic. In humans, molecules in the  $S_f$  12-20 class were found to contain about 30 per cent cholesterol and little protein. The quantitative presence of these molecules was statistically related to atherogenesis. Later a second class of molecules was added as significant in atherogenesis, namely, the  $S_f$  20-100, and still later another class,  $S_f$  100-400, less significant in atherogenesis and which may be greatly elevated by a fat meal. Lipid may enter this system in the form of high  $S_f$  lipoproteins, and as these complexes yield their neutral fat to the body depots, high  $S_f$  lipoproteins are successively changed to lower  $S_f$  members of the series.<sup>1</sup> Are these restricted classes of serum lipoproteins, when they are in high quantity in the circulating blood, the ones which signal developing atheroma? As yet there is no clear answer, but the trend among most authorities is toward accepting this concept. However, until the conclusions of the joint laboratory study are known, Gofman's concepts must be considered neither confirmed nor denied.

Goldbloom and associates<sup>4</sup> recently reported on the study of 500 subjects aged 13 to 100 years and found that at the ages of 60 to 75 years the trend toward increase of total lipids, certain serum lipoproteins, the atherogenic index, and the incidence of aortic dilatation is reversed. All these values begin to decline due to some invisible, not-understood barrier. Normal persons thus acquire their "second youth," and this may explain why they attain such ages as 80 to 100 years. On the other hand, perhaps those who do had throughout life a favorable chemical balance of their androgen and estrogen production.

#### NATURE OF INVOLVED LIPIDS AND PROTEINS

Absorption of cholesterol from the intestinal tract is by lymphatics along with fats and the necessary bile. Cholesterol esterified with fatty acids constitutes about 70 per cent of plasma cholesterol and is the more stable form of cholesterol. The liver appears to be necessary for conversion of the free to the ester form. Most tissues, except brain, can synthesize cholesterol, but the liver is most active in this regard, and the evidence points to the control of the plasma cholesterol by the liver.<sup>2</sup>

Neither cholesterol nor the other lipids, phospholipid and neutral fat, exist in plasma as pure substances. Lipids are the only large class of vital substances insoluble in water. They are bound to protein in the form of complex lipoprotein molecules. These compounds of lipoproteins contain different proportions of cholesterol, phospholipid, triglycerides, and protein. Electrophoretic or chemical techniques separate them grossly into alpha and beta lipoproteins. Ultracentrifugal analysis results in a classification of high- and low-density lipoproteins of varying  $S_f$ .

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The hyperlipemia of nephrosis as well as of some other diseases is dependent on a metabolic disorder which involves protein as well as lipid. Page suggests that a defect in the synthesis or degradation of the protein moiety of the lipoproteins might be at fault, and that this possible defective protein metabolism may be as important as defective lipid metabolism in atherogenesis.

### "FILTRATION" THEORY

The arteries are respiring, pulsating musculo-fibrous tubes. The arterial tissue uses oxygen and nourishment and is supplied by vasa vasorum—numerous small arteries distributed to the outer fibrous and elastic layer (tunica externa) and to the tunica media, the muscular layer. The blood is returned by small venae vasorum from the same layers. The inner layer, or tunica intima,

in arteries of medium size is composed of the endothelial lining, a thin layer of fine areolar tissue fibers and cells called sub-endothelial areolar tissue, and a layer of elastic fibrils running more or less longitudinally, forming an elastic, fenestrated membrane called the elastic lamina.

Apparently the intima has no capillaries running through it. Cleftlike intercellular spaces are present in the intima and media. They may be regarded as the commencement of lymph vessels, but definite lymph vessels are found only in the outer tunic.<sup>7</sup> The "filtration" concept of atherogenesis subscribed to by Page<sup>8</sup> and Martt and Conner<sup>9</sup> and generally accepted is as follows: Lipoprotein molecules filter from the plasma by lateral arterial pressure through the intima and into the media where they are picked up by the capillaries or by the adventitial lymph ducts. Some of these lipoprotein particles get caught in the subendothelial areolar tissue, either because the vessel fails to function properly as a filter or because the size, shape, and charge of the lipoproteins is such as to allow them to stick.

There is clear evidence that subendothelial fibroblastic proliferation, defects in the inner elastic lamella, and changes in the ground substance often are quite as impressive and may even precede the lipid changes of atherosclerosis. Changes in the arrangement, amount, and chemical nature of subendothelial ground substance may alter the filter function. This layer becomes thicker with long stress of hypertension. The nature of the lipid deposited and the responsiveness of the tissue to it will determine whether the lesion remains quiescent or whether a tissue reaction occurs which may cause necrosis and/or initiate a mural thrombus.<sup>7</sup>

Histologists tell us that mural thrombi are common in arteries during middle age and later. Most are asymptomatic, are soon covered by endothelium, and incorporated into the intima, gradually fibrosing and becoming additional layers to the atherosclerotic plaques. Segmental arterial spasm around a fresh thrombus may cause complete closure in an otherwise partially open vessel, hence the very great importance of nitrites in the treatment of early coronary occlusion.<sup>7</sup>

In early atherosclerosis the vessel wall shows a slowly progressive increase in total lipid content, of similar composition to plasma. This continues for some time and supports the view that the source of the vessel wall lipid is plasma lipid. The beta lipoprotein is considered to be the chief carrier of unstably held lipid. As the filtered lipoprotein breaks down, this "lightly bound" lipid is shed within the vessel wall. This lipid, freed from its combination with protein, is now insoluble in water, is foreign,

and is the nidus of a foreign-body reaction. As necrosis occurs, the normal plasma constituents, neutral fat, phospholipid, and free cholesterol decrease, and ester cholesterol increases disproportionately.

The basis of this concept accepts the movement of large amounts of plasma constituents through the vessel walls. To review all the work supporting this theory is not within the scope of this article.

### HYPERTENSION, OTHER ASSOCIATED DISEASES

When Master's criteria<sup>10</sup> are used, 5 per cent of individuals may be expected to have hypertension. Recently Goldstein and associates<sup>11</sup> found that 23.7 per cent of 135 males and 55 per cent of 65 females with coronary occlusion had hypertension. Therefore, hypertension occurred 4.75 times more frequently in their group of males and 11.5 times more frequently in their group of females with coronary occlusion than in otherwise comparable individuals without coronary occlusion. Hypertension is relatively more important in the female. This can be explained on the increased susceptibility of males in the fifth and sixth decades to atherosclerosis with or without hypertension. Premenopausal women are less prone to develop atherosclerosis and coronary occlusion, with or without hypertension. This is presumed to be due to the protective high estrogen production. Contracepted women do not manifest this protection.

The concentration of alpha and beta lipoproteins is normal in early essential hypertension. But, as it becomes severe or malignant, the classes of lipoproteins considered by Gofman and associates to be atherogenic all increase. The development of vascular disease, atherosclerotic, and/or hypertensive, especially if there is renal involvement, seems to be associated with great disturbance in the normal lipoprotein pattern of the blood.

Nephrotic, diabetic, and myxedematous patients also show abnormal lipoprotein patterns. These are examples of accelerated atherogenesis, and do not preclude other more slowly progressive varieties in which there is no detectable change in lipoproteins from what we consider normal.<sup>2</sup>

Idiopathic hyperlipemia is a hereditary condition in which there is a high fasting level of serum neutral fat. The triad of signs and symptoms includes abdominal pain, hepatosplenomegaly, and cutaneous xanthomata. Gofman and associates indicated that these patients have elevations of lipoprotein molecules of the classes S<sub>1</sub> 100-400 which are normally elevated after the ingestion of dietary fat. Clearance tests for orally ingested neutral fat, tagged with radioactive iodine, and vitamin A tolerance tests indicate a striking delay in the clearance of fat from the serum.

The condition is thought to be due to failure of liver and fat depots to remove dietary fat from the blood stream at a normal rate. The cause may, however, be an inherent inability to form adequate amounts of heparin. Restriction of dietary fat, with or without heparin, relieves the symptoms and lowers the plasma lipid much like restriction of carbohydrate, with or without insulin, lowers blood sugar and relieves the symptoms of diabetes mellitus. Hyperlipemic patients are subject to symptoms of coronary insufficiency which are relieved by treatment. Recently Martt and Connor<sup>4</sup> reported the first autopsied case of coronary occlusion occurring in a patient with idiopathic hyperlipemia.

### ENVIRONMENT

Factors of habit and environment as well as inheritance have been blamed as causes of atherosclerosis. I shall dismiss tobacco and alcohol from further discussion as there is insufficient reliable evidence on which to incriminate them in causing atherosclerosis. There is good evidence that tobacco increases established coronary insufficiency, probably by spasm—hence its importance here. And, at the risk of being very unpopular, I must say that reliable work does not bear out the coronary dilating theory of alcohol.<sup>4</sup> Perhaps we can still be comforted by the thought that, used properly, alcohol relieves some of the anxiety and stress of the day and under its mellowing influence we can have our coronary occlusions with less pain and strain.

Exertion within limits is more beneficial than harmful. The active man metabolizes exogenous dietary cholesterol and fats faster than the sedentary man. Men in sedentary occupations are more likely to develop coronary heart disease and, since this is caused by atherosclerosis, physical inactivity may influence its development or progression. The increased rhythmic expansion and contraction of the arteries during exercise may aid the pickup of lipids filtering through the vessel wall by lymph channels.

Occupation appears to influence atherogenesis, I believe indirectly. Perhaps it is that successful businessmen become successful because they have more drive—a preponderance of androgens over estrogens. Or with the mental stress of recurring minor crises, the effect of increased output of corticoids and intermittent elevations of blood pressure may play a part in atherogenesis. Finally, it may be that their living and eating habits result in an increased intake of fats. The increased incidence of atherosclerosis in middle-aged career soldiers is possibly related to the high content of fat in the Army ration.

The influence of fat in the diet has been considered in most countries of the world as an important factor in atherogenesis. The evidence, briefly, is as follows: In Norway during the war years, 1940 to 1945, during a marked curtailment of fat in the

diet, a sharp reduction in the incidence of deaths from coronary, cerebral, and generalized arteriosclerosis was reported. The reduction was approximately 50 per cent. From England a 50 per cent reduction of mortality in diabetics over the age of 45 is reported since the government instituted the rationing of fat at the onset of the last war. Over 100,000 diabetics in England alone have had their lives saved. Similar reports, though less impressive, come from France, Italy, Sweden, Finland, and Denmark.<sup>12</sup> Scattered reports of series of patients treated in this country by a low-fat diet in general favor the reduction of fat along with an over-all lowering of the caloric intake in the treatment of coronary atherosclerosis.<sup>6,12,13</sup> My own experience indicates excess fat intake to be one of the environmental factors which accelerates onset and progression of atherosclerosis. This is still controversial, however. Two recent studies not only present additional data reflecting the adverse influence of fats in the diet of patients with coronary occlusion, but they also lend support to the belief that the low-fat diet results in prolonged lowering of blood lipids. In the study by Roon,<sup>14</sup> 82 per cent of the total initial drop in serum cholesterol was maintained in 50 patients. The period of treatment at the time of the report was from 2½ to 4½ years. Unfortunately, ages were not given. The study from the University of California by Lyon and associates<sup>15</sup> was most complete and gave a follow-up study for a 5-year period of 351 patients with myocardial infarction and 119 patients with angina pectoris. In patients who did not adhere to a low-fat, low-cholesterol diet, the recurrence and death rate was 4 times as high as in patients who adhered to the diet. The low-fat, low-cholesterol diet was found to be effective in maintaining chronically lowered lipoprotein atherogenic index values.

Further information concerning the effect of a prolonged low-fat diet in maintaining a prolonged lowering of plasma cholesterol may be obtained from studies on repatriated American prisoners of the Korean conflict. During "Operation Little Switch" I was one of a group in a position to make certain studies which were published.<sup>16</sup> Serum cholesterol was run on 67 consecutive American prisoners within 24 hours of release by the enemy. The average value was 151 mg per 100 ml, including four with high levels compatible with familial hypercholesterolemia. These four were in the range of 500 to 600 mg per 100 ml. None of the remaining 63 were above 250 mg per 100 ml. Twenty-four had values below 130 mg per 100 ml. These men had been on low-fat, low-caloric diets for two to three years. The mean value of cholesterol done on serum of 25 nonprisoner soldiers at the same time by the same laboratory\* was 219 mg per 100 ml.

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\*U. S. Army Tokyo General Laboratory



## HEREDITY

Administration of methyltestosterone has been shown to alter the lipoproteins of serum in that the alpha levels are reduced and the beta levels are elevated. This is thought to be due to the androgenic influence on hepatic function.

Clinical trials of estrogens in males following coronary occlusion have shown increased protection from second occlusions.<sup>14</sup> The gynecomastia, loss of libido, and impotence were deterring complications in the earlier trials. However, trials with smaller dosages of different estrogens reportedly have resulted in minimizing the unfavorable side effects while retaining the protective action. The essence of a great deal of work with the sex hormones is that testosterone increases the beta lipoproteins. Estrogens are efficacious only insofar as they inhibit testicular androgen production, primarily via pituitary gonadotrophic inhibition and secondarily by neutralizing the circulating androgen. They have no effect in the postmenopausal atherosclerotic female, but are helpful in the premenopausal diabetic female in whom hypo-ovarianism is common. After castration, estrogen functions solely as an adrenal androgen depressant.<sup>15</sup>

Eleven relatively young men were currently under treatment for atherosclerotic heart disease in the outpatient facilities of this hospital. Their ages ranged from 32 to 52 years, 5 being under 40. Because of the seriousness of coronary disease in this age group, a trial on estrogen therapy was felt to be justified. A 75-year-old man with carcinoma of the prostate, who had had an orchidectomy, was added for interest. Plasma lipoprotein levels of alpha, beta, S<sub>1</sub> 12-20, and S<sub>1</sub> 20-100 fractions were done at the Walter Reed Army Institute of Research. After the initial determinations, each patient was treated with 0.02 mg of ethinyl estradiol daily for seven weeks. The plasma lipoprotein fractions were again determined, and individual values are shown in table 1. The results were altogether inconclusive. The treatment caused no undesirable symptoms during this period. Estrogen was discontinued. Low-fat, low-cholesterol diets were prescribed for all, and some were started on heparin sodium therapy. After using heparin sodium in a few for familiarization, it is planned to treat most of these men biweekly with 150 to 250 mg of concentrated aqueous heparin sodium subcutaneously for its plasma lipid-clearing action. The laboratory studies will be repeated later at 24- and 48-hour intervals following the previous injection.

Present studies of the cause of atherosclerosis have placed most of the emphasis upon an abnormal elevation of various lipid fractions, the levels of which are affected by patterns of heredity as well as by certain disease states and the increased ingestion of dietary fats. Atherosclerosis, particularly the coronary type, runs in families and represents a mild form of hereditary dis-

turbance of lipid metabolism. Alvord,<sup>11</sup> for instance, found that 15 members of one family had hyperlipemia, 6 had xanthoma tuberosum, and 18 had a history suggesting disease of the coronary arteries. A recent survey<sup>12</sup> of a group of Navajo Indians showed albumin to be lower than normal, and alpha and gamma globulin elevated. Alpha and beta lipoproteins were low, but other lipoproteins were normal. Total cholesterol values were considerably lower than what we consider to be normal. Since diet was the same as that given to the non-Indian control group, heredity appeared to be the most likely explanation for the different values found. The Navajos have a low incidence of coronary disease. Idiopathic hypercholesteremia may be produced by a single dominant gene. This could determine an individual's capacities and the nature of his reaction under specific conditions. Causative hereditary and environmental factors co-exist and are by no means mutually exclusive.

Men with the body type of prominent muscularity, compactness, and "maleness," the so-called mesomorphic type, are most likely to develop coronary disease at a younger age. Obviously, mesomorphy is hardly a remediable condition, but it is possible that diet and other measures may prevent the early onset of coronary atherosclerosis in this group.

Certain races appear to be prone to atherosclerosis regardless of diet. The Jews are perhaps the best example of this. Do Jewish males produce more testosterone and/or less heparin than, for example, Eskimos, who on a high-fat diet have a low incidence of atherosclerosis? Or is the anatomy, biochemistry, and physiology of the vessel wall, all of which are hereditarily conditioned, different in different races?

Studies of mast cells, which produce heparin, have shown decreased numbers of these cells in atherosclerosis, along with decreased amounts of circulating heparin. A recent report from the Cedars of Lebanon Hospital, Los Angeles, Calif.,<sup>3</sup> may indicate the importance of heparin sodium in the treatment as well as the development of atherosclerosis. One hundred and five patients with known previous myocardial infarctions were given 200 mg of aqueous heparin sodium subcutaneously twice weekly. One hundred and seventeen alternate patients with the same diagnosis and in the same age group were given injections of saline solution. Treatment was given for from 6 to 18 months, and at the end of 2 years there were 21 deaths due to cardiovascular disease in the control group and 4 in the heparin sodium-treated group. Symptomatic improvement occurred in 25 to 35 per cent of the controls and in 50 to 75 per cent of the treated group. These workers found that this dose of heparin sodium significantly lowered the blood level of low-density lipoproteins in these patients for as long as 24 to 36 hours and in some for as long as 72 hours.<sup>3</sup>

TABLE 1. Blood lipid values in 12 patients with coronary heart disease

Clinical data					Lipoproteins (mg/100 ml) before estrogen therapy				After 7 weeks of 0.02 mg ethinyl estradiol daily				
Patient	Age	Diagnosis	Months since onset	Other diseases	Total cholesterol	Alpha lipoprotein (76-142)*	Beta lipoprotein (61-189)	S <sub>I</sub> 12-20 (43-51)	S <sub>I</sub> 20-100 (72-84)	Alpha lipoprotein	Beta lipoprotein	S <sub>I</sub> 12-20	S <sub>I</sub> 20-100
1	36	Infarct, angina pectoris; shoulder-band	18	Hypertension	485	35*	268	104	188	97.2	228	112	332
2	37	Infarct	6	Obesity	620	58	234	68	156	58.6	260	34	67
3	41	Angina pectoris followed by infarct	20		405	44	238	47	106	Blood hemolyzed in transit			
4	46	Cardiomegaly, heart disease	3	Myxedema	370	56	280	61	95	36.5	241	34	150
5	42	Infarct followed by angina pectoris	36		460	52	236	38	92	98	263	38	63

TABLE I. Blood lipid values in 12 patients with coronary heart disease—Continued

Clinical data						Lipoproteins (mg/100 ml) before estrogen therapy					After 7 weeks of 0.02 mg ethinyl estradiol daily			
Patient	Age	Diagnosis	Months since onset	Other diseases	Total cholesterol	Alpha lipoprotein (76-142)	Beta lipoprotein (61-189)	S <sub>f</sub> 12-20 (43-51)	S <sub>f</sub> 20-100 (72-84)	Alpha lipoprotein	Beta lipoprotein	S <sub>f</sub> 12-20	S <sub>f</sub> 20-100	
6	50	Infarct	6	Obesity, hypertension	475	47	171	34	64	25.6	162	32	54	
7	52	Infarct	36		189	67	145	27	58	73.6	173	71	117	
8	39	Infarct	6		537	59	368	189	384	47.1	291	28	47	
9	32	Angina pectoris, abnormal ECG	6		405	43	318	65	78	45.6	253	49	145	
10	39	Infarct	3	Obesity, diabetes	630	58	313	63	244	29.4	342	76	80	
11	49	Infarct (3 times)	60		470	33	254	27	78	54.7	173	34	56	
12	79	Orchiectomy (no heart disease)	6	Carcinoma of prostate	207	58	135	38	135	57	225	47	96	

\*( ): Normal values — : Abnormal values

In all studies of the infiltration of vascular walls by lipids, time is an important factor. Thus, if the injection of heparin sodium is followed by a marked though temporary reduction of the low density lipoproteins, a transformation from high  $S_1$  to lower  $S_1$  lipoproteins, as reported by several workers,<sup>1,3,20</sup> considerable time may elapse even after the serum lipoproteins have reached their preheparin levels before substantial amounts again penetrate into the arterial walls. Furthermore, macromolecules form films upon the surfaces of the cells and the vascular intima, and, because of their inability to escape through the pores, would be most likely to form fat sludgos on the endothelium. Since it is precisely these larger fat particles which almost disappear following an adequate dose of heparin sodium, the harmful effects of intimal films—prevention of normal molecular exchange between the plasma and interstitial fluid, and the accumulation in the subendothelial tissues—should be substantially ameliorated by heparin sodium therapy. Reformation of films should take longer than the reaccumulation of plasma lipoproteins.

Finally, the beta lipoproteins have been found to interfere with glucose uptake in muscle. Their lowered concentration following heparin sodium therapy may permit more normal carbohydrate metabolism in diabetes.<sup>2</sup> This may be vital to heart muscles barely getting enough blood through a narrowed coronary artery.

Heparin sodium may be valuable in preventing platelet agglutination on the cement substance of injured endothelium, which may be the initial step in thrombosis. This is aside from its general anticoagulant action.

Heparin sodium may be used for years with no greater risk of hematoma formation or bleeding than the diabetic's risk from insulin reactions. In fact, insulin dosage should be lowered if heparin sodium is used in a patient taking insulin, since not as much is required.

A great number of investigators favor the use of heparin sodium as an anticoagulant in the prolonged treatment of impending or acute coronary occlusion because of its greater safety, dependability, and the relatively little laboratory control it requires, as well as for its lipid-clearing action.<sup>21-23</sup> This latter may prove to be vital, as ultracentrifugal studies have demonstrated that lipemic clearing is the result of a shift of serum lipoproteins from larger to smaller, less harmful particles.<sup>24</sup> Of more immediate clinical importance, however, is the recent appreciation that alimentary lipemia is associated with increased coagulability of the blood,<sup>25</sup> increased platelet adhesiveness and aggregation of erythrocytes, and an increase in viscosity.<sup>26-28</sup>

## SUMMARY AND CONCLUSIONS

The evidence is fairly conclusive that the circulating lipoproteins are the source of the increased lipids found in atherosclerotic vascular walls. The physical state and particle size of the lipoproteins are important, probably due to the filtration properties of the vessel walls.

Studies of numbers of mast cells in animals and humans, and of circulating heparin levels, indicate that decreased heparin production in the body may be etiologically important in the accumulation of large amounts of circulating low-density serum lipoproteins.

An unfavorable chemical balance of androgen over estrogen often results in increased levels of beta lipoproteins, which appears to be the prerequisite to atherogenesis. Treatment of 12 patients with 0.02 mg of ethinyl estradiol daily for seven weeks failed to produce consistent laboratory improvement.

Factors such as hypertension, diabetes mellitus, nephrosis, myxedema, local factors in the vascular wall, race, and eating habits unfavorably influence atherosclerosis.

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# PSYCHIATRIC PREDICTION AND MILITARY EFFECTIVENESS

## Part II\*

ALBERT J. GLASS, *Colonel, MC, USA*

FRANCIS J. RYAN, *Captain, MSC, USA*

ARDIE LUBIN, *Ph. D.*

C. V. RAMANA

ANTHONY C. TUCKER, *Colonel, MSC, USA*

**T**HE FIRST part of this study demonstrated that when psychiatrists estimated the future effectiveness of recruit inductees, their predictions of satisfactory duty were usually correct, but they were unable to efficiently identify the potentially unsatisfactory soldier. However, there still was the possibility that various components of the mental examination may be more accurate indicators of future unsatisfactory service than the over-all impression of the psychiatrist. For example, it was found that parental disharmony in the formative years, a poor school record was highly correlated with inadequate military duty, psychiatric selection could be made more efficient by properly weighing the positive history of such developmental events. In order to test this assumption, separate elements of the psychiatric examination were compared to military effectiveness.\*\*

## FAMILY HISTORY AND MILITARY PERFORMANCE

A major portion of the psychiatric examination was devoted to the circumstances of the early formative environment. Included in this sphere was the psychiatric status of parents and siblings as reported by the subjects. Family members were rated as mentally disturbed if there was a history of psychosis, neurosis or clear-cut personality disorder. Symptoms of a clear-cut personality disorder included alcoholism, seclusiveness, and antisocial behavior. Table 12 indicates a small but significant relationship between psychiatric abnormalities in siblings and

\*Part I was published in the October 1956 issue of this Journal.

\*\*Source of data for this paper is *Psychiatric Prediction and Military Effectiveness*, Research Report No. WRAIR-64-56, Walter Reed Army Institute of Research. (In preparation)  
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unsatisfactory military performance. The influence of mental disturbance in the mother is similar but less striking, although still statistically significant. Psychiatric abnormality of the father was unrelated to military effectiveness.

Another component of the family history concerned the absence of one or both parents because of death, divorce, or severe chronic illness. It is reasonable to believe that inductees from so-called "broken homes" are more apt to become marginal or poor soldiers than individuals who originate from "normal" homes. This hypothesis was tested in table 12 with negative results. Similar inconclusive findings were obtained when the influence of substitute parents upon military performance was explored.

Conflict between parents is usually regarded as deleterious to adequate childhood development. However, table 12 reveals that parental disharmony was not related to military effectiveness. Negative results were also obtained when the influence of overt sibling rivalry upon later duty performance was considered.

The psychiatric examination also recorded the attitude of the subjects toward their parents. Most subjects gave conventional responses of normal positive feelings toward father and mother. The small minority who expressed deviant attitudes of over-attachment, resentment, or ambivalence did not exhibit a significant diminution of military function (table 12).

Economic status of the family during the formative years may play a role in the formation of adult patterns of behavior. Parental economic status was rated as marginal or relief only if difficult financial conditions persisted for two or more years. Table 12 demonstrates that this aspect of family history was statistically related to military effectiveness.

It can be postulated that past or current assimilation difficulties of foreign-born subjects or subjects with foreign-born parents may hinder adjustment to the new military environment. In measuring the effect of cultural differences upon ability to function in the Army, table 12 reveals that this apparent handicap was not a barrier to satisfactory duty.

The influence of religion in the home also was explored for its relationship to military effectiveness. A majority of subjects studied stated that religion was a positive force in the childhood home. The remainder reported religion to be of little or no importance in their formative years. As shown in table 12, this aspect of the early environment did not significantly alter military effectiveness.

The position of the individual in the family constellation in relation to other siblings has been cited as pertinent in the

TABLE 12. *Family history and military performance*

Criteria	Positive history		Negative history		Statistical significance*
	Number	Per cent satisfactory duty	Number	Per cent unsatisfactory duty	
Mental abnormality of siblings	48	73	457**	90	.001
Mental abnormality of mother	75	81	430	90	.05
Mental abnormality of father	66	83	439	90	.2
Death, divorce, or chronic illness of parents	148	86	357	90	.5
Substitute mother, father, or both	95	85	410	90	.3
Moderate to marked parental disharmony	126	84	379	91	.1
Overt sibling rivalry	68	84	437**	90	.3
Over-attachment, resentment, or ambivalence toward father	121	86	384	90	.4
Over-attachment, resentment, or ambivalence toward mother	103	83	402	90	.1
Marginal or relief economic status of parents***	223	84	281	93	.01
Assimilation difficulties of subjects or parents	72	83	433	90	.2
Religion of no influence in home	197	87	307	90	.3

\*Above .05 is not considered statistically significant. Chi-square method used in computing levels of statistical significance.

\*\*Includes 52 individuals without siblings.

\*\*\*One case not rated.

development of personality traits such as aggressiveness, dependency, and the like. This question is considered in table 13, and the results indicate that family position had no significance insofar as military performance was concerned.

TABLE 13. *Position in sibling constellation and military performance\**

Position	Number	Per cent satisfactory duty
Youngest, only boy, or only child	230	90
Eldest child or eldest boy	176	88
Middle or other child	99	88

\*Level of statistical significance .5

To recapitulate, this study could establish little or no relationship between environmental circumstances of the past as related by the subjects and their military performance. These rather negative results do not negate commonly held beliefs that early experiences influence later adult behavioral patterns. The results do indicate that retrospective and subjective accounts of the past as given by subjects under conditions of psychiatric evaluation in this or similar studies were not valid indicators of military performance. Moreover, although the death of parents, financial hardship, and position in the family are factual, it apparently is the impact of these events upon the individual that is of more significance for later behavior than is their mere occurrence.

#### PRESERVICE ADJUSTMENT AND MILITARY PERFORMANCE

The second major section of the standardized psychiatric examination dealt with behavior of the subject prior to induction. The first item in this area concerned the individual's adjustment to the family. Adjustment was rated as questionable or impaired if the subject (1) left home before the end of adolescence, (2) quarrelled incessantly with parents or siblings, or (3) was overly dependent upon the family, unable to make independent decisions, or cetera.

Table 14 indicates a small but significant relationship between faulty family adjustment and unsatisfactory military duty.

Another element of preservice behavior involved sexual adjustment. A rating of questionable or impaired adjustment in this sphere was given if there was a history of: (1) repressed sexual drive as manifested by avoidance of the opposite sex, lack of sexual activity, or disgust and overly moral attitudes; (2) exces-

sivo preoccupation with sex over an extended period; or (3) persistent overt homosexual desires or activity.

TABLE 14. *Preservice adjustment and military performance*

Area of maladjustment	Satisfactory duty				Statistical significance
	Positive history		Negative history		
	No.	%	No.	%	
Parental family	86	80	419	91	.01
Sex	124	89	381	89	NS*
School	152	80	353	93	.001
Work	71	76	434	91	.001
Social and recreational life	79	80	426	91	.01
Community	36	67	469	91	.001

\*No significance

As demonstrated in table 14, inadequate sexual adjustment was not related to military effectiveness. This finding is not surprising since the sexual drive is usually in a state of flux during early adult life. Thus it was difficult to establish valid criteria of sexual normalcy for the young subjects of this study.

Tangible evidence of achievement and conformity in a structured environment is represented by the school record, which should be a good indicator of future military performance. School adjustment was rated as questionable or impaired if there was a history of (1) consistent failure of the subject to apply himself to his academic task; (2) marked failure to associate with fellow students; or (3) serious disciplinary difficulties with teachers.

As expected, this criterion was significantly correlated with military performance (table 14).

The work record is another objective past accomplishment which involves tasks and obligations similar to that imposed by military service. However, most of the youthful subjects in this study had relatively little time in which to establish patterns of work behavior. A rating of questionable or impaired work adjustment was given if there was (1) floating from job to job; (2) repeated discharges from jobs; (3) chronic difficulties with fellow employees or superiors; or (4) failure to work when opportunities are available.

Based on the above criteria, table 14 reveals that the work record, even in young subjects, was significantly related to military effectiveness.

In assessing social and recreational adjustment, the examining psychiatrists were requested to take into account all interpersonal relationships not centered upon home, work, school, or sex. Impairment in this category was considered present if there was evidence of (1) seclusive, withdrawn behavior; (2) overly aggressive or hostile behavior toward others; or (3) absence of any recreational life.

Table 14 indicates that maladjustment in this area was also statistically correlated with military performance.

The last category of preservice behavior concerned adjustment to the community. A rating of maladjustment was given if there had occurred (1) overt crimes of one kind or another; or (2) trouble-making short of criminal behavior, such as public brawling, obnoxious behavior, when drunk, et cetera.

Table 14 revealed that antisocial behavior was the most significant preservice indicator of unsatisfactory military duty. Because of past and present induction standards which exclude persons who have been convicted of a felony, there were relatively few subjects who were rated as having impaired community adjustment.

It is apparent from table 14 that preservice adjustment is a more efficient predictor of later military performance than the category of family history. Yet it should not be forgotten that the bulk of subjects who were considered maladjusted in any area of preservice behavior did render satisfactory duty. Therefore a positive history of such deviant behavior can only indicate an increased probability of noneffective military functioning rather than a valid reason for psychiatric rejection.

It was not possible to improve the efficiency of prediction by adding two or more criteria of preservice adjustment. The number of subjects who were rated as maladjusted in several areas were too few for accurate statistical analysis. Also little additive benefits were achieved by combining two or more criteria of impaired preservice behavior since the same phenomenon was measured; namely, maladjustment to the preservice environment as represented by school, work, or the community.

#### PSYCHOPATHOLOGY AND MILITARY PERFORMANCE

The standard examination form required the psychiatrist to record his clinical impression regarding the extent of psychopathology that was found, in relation to the following categories:

1. Well integrated.

2. Neurotic personality—used to designate neurotic traits or immature reactions which did not disable or incapacitate.

3. Suggestive neurosis—for suggestive psychogenic somatization reactions, immature reactions, or long-standing neurotic symptoms, where there is no clear-cut incapacity or illness.

4. Overt neurosis—where incapacity has resulted from neurotic traits or symptoms.

5. Pathologic personality—includes excessive seclusiveness, anti-social behavior, sexual deviations, and definite pathologic behavior in interpersonal relations with none of the above neurotic patterns.

6. Latent or overt psychosis.

Table 15 indicates that as the severity of psychopathologic symptoms as diagnosed by the psychiatrist increases, military effectiveness decreases. The "well integrated" category, signifying an absence of deviant history or abnormal findings, identifies a superior group in which 90 per cent or more rendered effective service. The performances of those with borderline or mild abnormalities such as "neurotic personality" and "suggestive neurosis" were only somewhat less effective than the average

TABLE 15. *Psychopathology and military performance\**

Category	Number of inductees	Per cent performing satisfactory duty
Well integrated	273	93
Neurotic personality	131	88
Suggestive neurosis	38	84
Pathologic personality	38	81
Overt neurosis	22	68
Latent and overt psychosis	3	0
Total group	505	89

\*Level of statistical significance .001

of the entire group. An interesting result was obtained in the "pathologic personality" group. Although this category includes aggressive, impulsive persons who frequently resort to anti-social behavior and usually have a marginal or poor preservice record, over 80 per cent of those so classified performed useful military service. Although these individuals are often considered to be poor garrison or peacetime soldiers, this finding confirms

the general impression of many psychiatrists that aggressive, unstable personnel often perform creditably under combat and other wartime circumstances. The group judged as having "overt neurosis" had preservice or current disabling neurotic illness. It is noteworthy that two thirds of these subjects rendered satisfactory duty. It is difficult to form firm conclusions from the three individuals who were diagnosed as having latent or overt psychoses. When psychopathologic symptoms are severe and grossly evident, such men should be rejected for military service. However, none of the three subjects were discharged as clinically psychotic. They did exhibit inadequate behavior, and two received administrative types of discharge for unsuitability.

### INTELLIGENCE AND MILITARY PERFORMANCE

Intellectual ability is a traditional measuring device of fitness for both civilian employment and military duty. In order to qualify for military service, selectees must be morally fit, obtain a required score on the Armed Forces Qualification Test (AFQT), and meet proscribed medical standards. The usual rejection rates for each requirement are indicated by the results of preinduction examinations during the first year of the Korean conflict (table 16).

TABLE 16. Results of preinduction examinations under the Selective Service Extension Act of 1950<sup>1a</sup>  
(July 1950 through June 1951)

Results of examination	Per cent of inductees
Not acceptable	
For medical reasons only	15.0
Failed AFQT and medical	3.9
Failed AFQT only	15.2
Administrative disqualification*	1.0
Acceptable	64.9

\*Morally unfit, based on previous criminal behavior in most cases.

From the above data, it is clear that failure to pass the AFQT is a major cause of disqualification for military service. Essentially a modified intelligence test battery, the AFQT was introduced in 1950 to meet the needs of the three armed services for a single standard designed to estimate learning potential. Under this standard, individuals could be classified according to their

ability to absorb military training. From the AFQT score, the following groups were devised:

Group	Percentile score
1	93-100
2	65-92
3	31-64
4	10-30
5	0-9

Persons who score in group 5 are generally rejected for military service because they are considered untrainable by the usual methods of military instruction. In practice some selectees who failed to score above group 5 were "administratively" accepted. Those were individuals whose AFQT score was inconsistent with their educational and work attainments or individuals whose motivation for the test was presumed poor.

The material of this study provided an opportunity to assay the usefulness of the AFQT in predicting military performance. Approximately 11 per cent of the subjects scored in group 5 of the AFQT. Those subjects must be regarded as representing a superior level of those who failed the AFQT, since there must have been educational, work achievement, or other factors which influenced induction officials to accept them. It is believed that the performance of group 5 subjects in this study could provide some indication of the potential military usefulness of others who failed the AFQT and were thereby eliminated at induction. The relationship of AFQT results and performance is shown in table 17.

TABLE 17. AFQT results and military performance\*

Group	Number	Per cent giving satisfactory service**
1	47	94
2	98	95
3	150	90
4	148	86
5	58	80

\*Level of statistical significance .001

\*\*Four cases unknown



These results demonstrate a significant positive relationship of the AFQT groupings to military performance, but ability of the AFQT to identify potential unsatisfactory soldiers is questionable since 80 per cent of group 5 subjects rendered adequate duty. In this respect the AFQT did not demonstrate any greater accuracy than several elements of the psychiatric examination.

It is of interest to compare the efficiency of the AFQT with other measures of intellectual capacity. The examining psychiatrists in this study also rated the intelligence of each subject by the clinical impression that was obtained at the interview.

From the results shown in table 18 it is evident that intelligence as judged by the psychiatrist was also significantly related to military effectiveness. However, except for the small number considered to be deficient, clinical estimation of the subjects' intelligence was less efficient than the AFQT.

TABLE 18. *Clinical estimation of intelligence and military performance\**

Category	Number	Per cent giving satisfactory duty
Definitely superior	38	95
Average or above (not superior)	360	91
Below average	95	81
Deficient	12	58

\*Level of statistical significance .001

Another measure of intelligence is educational attainment. Table 19 indicates that low educational attainment (0 to 7th

TABLE 19. *Educational attainment and military performance\**

Educational level completed	Number	Per cent giving satisfactory duty
High school or better (12 or more grades)	295	95
9th to 11th grade	115	84
8th grade	48	83
0 to 7th grade	44	68

\*Level of statistical significance .001

grado) was a better predictor of unsatisfactory performance than the corresponding group 5 of the AFQT. High educational level and AFQT groups 1 and 2 were equally effective in the selection of a superior group who rendered 95 per cent satisfactory duty. However, educational criteria placed 298 subjects in the superior group in contrast to only 145 subjects in groups 1 and 2 of the AFQT score. Scholastic achievement is more than an index of endowed and acquired knowledge, for it is also a valid record of prior adjustment in a disciplined and structured environment. Success in school requires not only intellectual ability but reasonable compliance to authority, some capacity to tolerate frustration, and sufficient maturity to relinquish immediate goals for later and more socially desirable objectives, all of which are similar to requirements for adequate adjustment in a military setting.

### COMMENTS AND CONCLUSIONS

This study tested a major and unresolved question in military psychiatry; namely, can qualified psychiatrists, given a reasonable period of interview time, efficiently predict the future military usefulness of newly inducted draftees or enlistees? Psychiatric selection as such was not directly investigated since the subjects who participated in the project had been medically screened and otherwise found acceptable for military service. Nevertheless, the results of this study are pertinent to the problems of psychiatric selection, for the following reasons: (1) If it is demonstrated that psychiatric impressions are obtained at the inception of military service and are found to have little or no predictive relationship with subsequent performance, these data would constitute strong evidence for doubting the practical value of psychiatric screening. (2) If certain components of the mental examination are found to be more significantly correlated with military effectiveness than the over-all impression of the psychiatrist, the proper use of this information could enhance the reliability of psychiatric selection methods.

The results of this study can be summarized by the following conclusions:

*1. Psychiatric and psychologic criteria were unable to efficiently identify the potentially unsatisfactory soldier.*

Only 25 per cent of the psychiatrist's predictions of unsatisfactory service proved to be correct, whereas their estimations of satisfactory duty achieved 90 per cent accuracy. Similar results were obtained by training officer prediction, the AFQT score, and several items of the psychiatric examination. This relative inability to properly identify the potential military failure can be ascribed to one or more of the following inherent sources of error in psychiatric prediction.

*Efficient psychiatric screening requires an unusually high degree of accuracy.* As demonstrated in this study and similar investigations, 85 to 90 per cent of military personnel render adequate service. It is necessary to obtain 95 per cent or better correct predictions in order to justify rejection for psychiatric reasons, except in those individuals who are obviously unfit by virtue of gross mental defect or disease. Thus, from a purely statistical standpoint, psychiatric selection faces a formidable task. Only a small minority of candidates can be rejected, and these individuals must have a strong likelihood of noneffective performance, regardless of assignment or other circumstances.

*The element of time markedly influences the accuracy of prediction for unsatisfactory service.* When the future military performance of inductees is estimated for a long duration of time (over 6 months), there is a sharp decrease in the number of correct predictions for below-average and poor duty. This effect of time is clearly illustrated in table 8 (Part 1) of this study, in which 8 of the 9 subjects who were judged to render poor function in the Zone of the Interior are correctly identified. All of these military failures occurred in the initial five months of service, and three subjects were being processed for discharge at the time of the psychiatric examination. In sharp contrast were the results of prediction for overseas and combat assignments which involved subjects who had completed five to six months of training. In those groups, forecasts of unsatisfactory performance were rarely correct (tables 4 through 7, Part 1). It is evident that gross errors in estimating long-term military adjustment are inevitable since a sufficiency of time permits environmental changes and other situational circumstances to exert a profound influence on motivation and behavior which cannot be predetermined. Because of the foregoing reasons, psychiatrists can hope to make valid predictions of unsatisfactory service only for brief periods of time under known and relatively uniform environmental conditions, such as the training phase.

*Professional differences among psychiatrists influence prediction.* The six examining psychiatrists of this study, although fully qualified by training and experience, nevertheless exhibited individual patterns of predicting military performance. Among the psychiatrists there was considerable variation in both the type and proportion of subjects estimated to render unsatisfactory duty. This aspect of psychiatric selection will be more fully explored in a later report.

*2. Psychiatric criteria can identify groups of varying military effectiveness.*

The results of this study indicate that relative degrees of predisposition or adaptability to military stress can be demon-

strated in groups of individuals. Certain psychologic and sociological data that include school and work record; educational attainment; community, social, and recreational adjustment; the AFQT; judgment of line officers, and the clinical impression of the psychiatrist were found to be significantly related to military performance. By using any of the foregoing criteria, inductees could be classified into one of the following categories (based upon percentage of effective individuals); namely, (1) superior, from 90 to 95 per cent; (2) average, from 80 to 90 per cent; and (3) inferior, from 70 to 80 per cent.

Predictors that contained some measurement of intellectual ability provided the most practical index of potential military effectiveness. This conclusion is supported by findings that school record, educational level, the AFQT, and intelligence ratings by psychiatrists are highly correlated with each other and as individual rating devices gave better predictive relationships to military performance than other background data. Educational attainment was perhaps the best predictor of the intellectual measures. This information achieved a useful discrimination among the subjects for it placed the largest proportion (60 per cent of the total) in a superior group and correctly predicted the highest percentage of unsatisfactory duty in the inferior category (tables 17 through 19). Moreover, educational level is a relatively simple and concrete type of information that can be obtained from the inductee with a minimum of distortion, although, admittedly, standards of education do vary in the various geographic regions of the United States.

That inductee or selectee groups of varying efficiency can be identified by psychiatric data has also been demonstrated by Aita<sup>4,5,10,11</sup>. Indeed it is this aspect of psychiatric prediction which has given rise to the optimistic statements made by Wittson and Hunt<sup>12</sup> regarding the validity and usefulness of psychiatric screening. Their contentions may be correct if the objective of psychiatric selection is to insure the largest proportion of effective servicemen without regard for the number of potentially satisfactory individuals who will be eliminated by such a process. Screening procedures of this type may be justified in the selection of officer candidates or men for highly specialized tasks, or in maintaining a relatively small cadre type Army where the limited number of individuals required make it profitable to exclude "inferior" or even "average" categories. Also, rejectees under such a program are not necessarily lost to the service. However, the huge manpower requirements of a general mobilization will not permit the losses that would occur if predisposition standards such as outlined above were put in practice. For example, in "inferior" groups the removal of three potential failures

would also eliminate seven others who were capable of satisfactory military service. In order to meet the needs of the armed services during wartime, psychiatric selection methods must be sufficiently accurate to identify an inferior group, more than 50 per cent of whom will inevitably become a burden to the military effort.

### SUMMARY

Psychiatrists, the AFQT, and various components of the mental examination were unable to efficiently identify potential military failures. From the standpoint of general mobilization, these results indicate that further investigative efforts should be undertaken during this peacetime era in order to insure more accurate methods of psychiatric screening because they will be vitally needed in the event of another major conflict.

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### THE "COMMON" MAN

"The patient who is a living detective-story may also be, I suggested, a poem of many parts that can, from time to time, reflect the light of sublimity. This you may find hard to credit when you examine some shrivelled little man with hammet-toes and a smoker's cough; but even he, even the most drably insignificant of your patients, will have had some experience of the wonder and mystery in which we live, and confidently he can expect more. He was born, and he will die; and no one who has seen birth and death can deny that 'fearfully and wonderfully are we made,' or dispute the mystery that envelops us and, at the end, gives to the meanest a moment of dignity.

—ERIC LINKLATER  
in *British Medical Journal*  
pp. 1518-1519, Dec. 24, 1955

# CUP AND REPLACEMENT ARTHROPLASTIES

## Experiences in an Army Hospital

JAMES D. CASKIE, *Lieutenant Colonel, MC, USA*  
JOSEPH W. BATCH, *Colonel, MC, USA*

SINCE the popularization of hip arthroplasty with the vitallium cup method of Smith-Petersen,<sup>1</sup> and more recently with the replacement prosthesis methods of Judet,<sup>2</sup> Eichor,<sup>3</sup> Moore,<sup>4</sup> Thomson,<sup>5</sup> Nissen-Rieth,<sup>6</sup> and others,<sup>7-10</sup> much has been written on each of these methods as a means of treating various conditions affecting the hip joint. The study herein reported was undertaken to compare the various methods employed in this hospital, where individual orthopedic surgeons have used different methods of arthroplasty.

TABLE 1. *Pathologic hip conditions treated at Brooke Army Hospital (1949-1955)*

Hip condition	Number
Fractures (all kinds)	224
Aseptic necrosis	10
Nonunion, fractures	39
Dislocations, traumatic	93
Dislocations, congenital	72
Ankylosis	49
Gunshot wounds	13
Arthritis	23
Tumors	5
Degenerative joint disease	5
Total	583

From 1949 through 1955, 583 pathologic conditions involving the hip joint were encountered (table 1). Of those 583 hip conditions, 43 (in 40 patients) were deemed amenable to treatment with 19 cup and 24 replacement prosthesis arthroplasties. The conditions for which these arthroplasties were performed are listed in table 2.

From Brooke Army Hospital, Fort Sam Houston, Tex. Lt. Col. Caskie is now assigned to Fitzsimons Army Hospital, Denver, Colo.

TABLE 2. *Conditions for which cup or replacement arthroplasties were performed*

Condition	Arthroplasty	
	Cup	Prosthesis
Traumatic arthritis	2	2
Unsatisfactory Judet prosthesis		1
Osteoarthritis	2	1
Rheumatoid arthritis	3	4
Septic arthritis—old	4	0
Aseptic necrosis, head of femur	6	3
Fracture, simple, comminuted, neck of femur	1	5
Fracture, open, gunshot wound, head of femur		1
Nonunion, fracture, neck of femur		7
Pathologic fracture, neck of femur	1	
Total	19	24

## INDICATIONS

Initially in this series, cup arthroplasties were employed exclusively; during the early 1950's replacement prostheses began to be utilized; and more recently, with a crystallization of indications for the type of treatment, cup and replacement prostheses have been utilized about equally.

In general, whenever only the head of the femur was damaged, cup arthroplasty was employed. A Judet type prosthesis was used when the condition of the head precluded nailing, bone graft, and osteotomy and where sufficient length of neck remained. When the head and neck were destroyed, an intramedullary type of prosthesis was employed (table 3).

TABLE 3. *Types of arthroplasties performed by years*

Year	Cup	Judet	Thomson	Moore	Eicher	Näden-Rieth
1949-1950	6					
1950-1951	3	4				
1951-1952	3	8				
1952-1953	1		1	3	1*	
1953-1954	3	1		1		1
1954-1955	3			3		1
Total	19	13	1	7	1	2

\*This replaced one of the Judet prostheses inserted during 1950-1951.

The principal conditions for which cup arthroplasties were performed were aseptic necrosis of the femoral head, traumatic arthritis, and osteoarthritis. Prostheses were utilized primarily

for fresh, comminuted fractures of the head of the femur in the younger age group; fresh, comminuted fractures of the head and neck in the older age group; and persistent nonunion of fractures of the neck of the femur. The earlier prostheses were of the Judet type, more recently only the metallic replacement prosthesis has been employed.

There was one patient in the 50-60 year age group with bilateral cup arthroplasty, one patient in the 20-30 year age group with a bilateral Judet prosthesis, and one patient in whom an original Judet prosthesis was replaced with an Eicher prosthesis. This Judet prosthesis, originally inserted for traumatic arthritis, was an early nylon type which on removal showed marked roughening of the head portion and areas that appeared to have been worn down as if sandpapered during joint motion. Seventeen patients were female and 23 were male, with an average age of 33.8 years in the cup group and 49.4 years in the prosthesis group (table 4).

A variety of approaches and modifications were employed, but the posterolateral approach was considered to be more functional, technically easier, and less traumatic, allowing earlier rehabilitation.

#### COMPLICATIONS AND FOLLOW-UPS

In this series of 43 operations performed on 40 patients, 4 patients were lost to follow-up. Sixteen patients with 17 cup arthroplasties have been followed an average of 31.8 months, and 20 patients with 22 replacement prostheses have been followed an average of 29.7 months (table 5).

There were 28 complications—12 in the cup arthroplasty group and 16 in the prosthetic replacement group. The complications, which compare favorably in number and type with other similar series,<sup>11,12</sup> are listed in table 6. They include 3 dislocations of the hip, 4 fractures of the neck or trochanter including 1 fracture dislocation in a Judet prosthesis, 2 cases of thrombophlebitis, 2 sciatic nerve injuries, and 4 infections or reinfections. Three of these were reinfections in old septic hips, which in two cases ultimately resulted in satisfactory ankylosis. There were no deaths in the series, although two patients have subsequently died—one patient four years after insertion of a Judet prosthesis and the other one nine months after the insertion of a Moore prosthesis. Pain, although listed as a complication, was slight in nature in three patients and was not a major factor resulting in limitation of motion or function. One patient with a Moore prosthesis was entirely relieved of pain by an obturator neurectomy. In the five fractures that were encountered, three occurred in the reduction of the prosthesis at time of surgery and two resulted from falls. There was one fracture dislocation in which the fracture eventually healed with the Judet prosthesis dislocated. The



TABLE 4. Types of arthroplasties performed by age of patient

Age of patient (years)	Cup		Naden-Rieth		Judet		Moore		Eicher		Thomson		Total
	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	
0-10	2	1											2
10-20	4	2		1	2		1			1		1	10
20-30	1												6
30-40	4				1	1							6
40-50	3		1		1								7
50-60	1				2	3	1						8
60-70		1				1	1						4
70-80													
Subtotal	15	4	1	1	6	7	3	4		1		1	43
Total	19		2		13		7		1		1		43

remaining fractures healed, but two resulted in marked limitation of motion, one in a cup arthroplasty and one in a Judet prosthesis. The remaining dislocations produced no problems other than the required secondary reduction, and both ultimately showed excellent results. Both patients in whom thrombophlebitis was a complication recovered; one returned to duty and was capable of playing 18 holes of golf.

TABLE 5. *Average follow-up time*

Duration of follow-up (months)	Type of arthroplasty	
	Cup	Protheses
6	1	3
12	2	1
24	6	7
36	2	5
48	3	2
60	2	2

TABLE 6. *Complications*

Complication	Type of arthroplasty					Total
	Cup	Judet	Moore	Eicher	Thomson	
Pain	1	1		1		3
Dislocation	1	1			1	3
Infection	3				1	4
Fracture, neck of trochanter	1	2	1			4
Shortening (1 inch plus)	2	2				4
Fracture, femur, in fall	1					1
Thrombophlebitis		1	1			2
Limitation of motion	2					2
Sciatic nerve injury	1	1				2
Arthritis		1				1
Myositis ossificans		2				2
Total	12	11	2	1	2	28

## RESULTS

In spite of a large number of complications, the final results in the follow-up cases were satisfactory (table 7). In the prosthetic replacement group, 86.3 per cent, and in the cup arthroplasty group, 76.4 per cent were considered to have excellent or good results. In evaluating the end results, range of motion, gait, freedom from pain and limp, and functional capacity were considered. The average range of motion of the hip in patients

with a prosthesis was 85° of flexion and 19° of abduction. In those patients who had a cup arthroplasty, the average range of motion was 89° of flexion and 21° of abduction. One patient with a Judet prosthesis and one patient with a cup arthroplasty complained unusually of pain and limp, but in both cases there was shortening of more than 1 inch. The patient with the Judet prosthesis obtained marked relief and improvement in gait after a lift was applied to the shoe. One patient with cup arthroplasty who had 2½ inches of shortening was given a 1-inch shoe lift, with marked improvement in gait and decrease in pain. This patient returned to duty as a traction and cast-room technician. Two patients with sciatic nerve damage walked well with foot-drop spring braces. One of them recovered totally and after two years discarded his brace.

TABLE 7. *Results of arthroplasties*

Type of arthroplasty	Result					Total
	Excellent	Good	Fair	Poor	No follow-up	
Moore	4	2	1			7
Eicher	1					1
Thomson		1				1
Naden-Rieth	2					2
Judet	5	4		2	2	13
Cup	9	4		4	2	19
Total	21	11	1	6	4	43

## SUMMARY

Of a total of 583 pathologic hip conditions, 43 conditions in 40 patients were treated by cup or prosthetic replacement arthroplasties. Although a large number of complications were encountered, the end results in both the prosthetic replacement and cup arthroplasty groups were considered satisfactory. This was particularly true when the proper surgical procedure was selected for the indications present in the individual patient, with consideration of cup arthroplasty in the younger age group and prosthetic replacement in the older age group.

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### FRACTURES OF THE FIRST RIB

"In dealing with closed thoracic injuries, especially those produced by high speed automotive accidents, one is obligated to search carefully for evidence of first rib fracture, which may be easily overlooked before callus formation begins.

"Patients suffering such fractures, without early manifestations of mediastinal lesion, must be thoroughly examined at frequent intervals; for at least two years following injury. Each examination should include an x-ray of the chest.

"Widening of the superior mediastinal shadow in the vicinity of the aortic arch following chest injury should be considered a sign of possible incomplete rupture of the aorta, or other great vessel, from which aneurysm may develop."

—THOMAS W. HOLMES, Jr., M. D.  
RUSH E. NETTERVILLE, M. D.  
in *The Journal of Thoracic Surgery*  
pp. 89-90, July 1956

# ON THE READING OF MEDICAL LITERATURE

With Remarks on "The Derollment of Reason"

ALAN GREGG, M. D.

WHEN I was a student in Harvard Medical School, in 1915, I was piqued because I heard frequent praise of the Harvard Law School and rarely anything comparable regarding the Medical School. So I decided to cut my classes for three days and go to Law School lectures. It was worth it. I was surprised and deeply impressed to see how much attention was given in the Law School to learning *how* to think, as contrasted with learning *what* to think. In essence it seemed that the difference was between the dynamic and the static—how to think prepared you for the future, what to think recorded the past.

I have begun with this story and the distinction between learning how to think and learning what to think, because I believe that the cardinal requirement for effective reading of medical literature is discrimination, and discrimination depends directly on learning how to think. Even today our medical schools pay little or no attention to this essential skill.

In 1928 the organizer of the British Medical Research Council, Sir Walter Fletcher, asked me, "What do you think about the medical curriculum?" It appeared clear to him that the factual additions to knowledge made by medical science had already passed the capabilities of even the best students to master in four years, and there was no reason to suppose either that the important facts would become fewer, or that another year or two could be added to the medical school's share in the preparation for medicine. He thought that the only solution would be found in a totally fresh review of medical education and the curriculum thereof. He suggested that attention be given first of all to choosing the capacities or abilities essential to every practitioner, researcher, or teacher. Once these capacities had been agreed on, we could devote the curriculum to strengthening and refining them, leaving to the years of practical clinical or laboratory experience as much as possible of the memorizing of facts and the acquirement of skill.

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Dr. Gregg was for 21 years Director for the Medical Sciences and now is Vice President of The Rockefeller Foundation, 49 W. 49th St., New York 20, N. Y.

I do not remember whether he named these capacities, but after long reflection I would suggest that they are these: the capacity to observe, the capacity to reason from your own observations, the ability to compare your observations and reasoning with the observations and reasoning of others, and, at quite a different level of performance, the ability to put yourself in the place of the patient—to acquire or develop compassion. You can readily see that the capacity to read medical literature forms a large share of the task of comparing your observations and reasoning with that of others, and let me add that the best—not the only, but the *best*—time to read medical literature is after you have done some observing and reasoning of your own, and not as a substitute for it.

When I say reading I mean critical reading. Even as you read this sentence (if you are a discriminating reader) you will say "critical of whom and of what?" My answer would be: critical of the author, whoever he be, and of his reasoning as well. The classic definition of rhetoric throws delightful light on this problem, for it says, "Rhetoric is the art of conveying conviction without resort to logic." Shades of the Detail Man! What a doft warning! It is even possible that if you begin by learning to read other people's writing critically you may thereby learn, even though it be at long last, to be effectively critical of what you yourself say and write.

The question "critical of what?" puts its roots into a larger area and to a greater depth. I have found much illumination in a remark attributed to Oscar Wilde to the effect that "all criticism is a form of autobiography." For example, General von Blücher's critical appraisal of Paris tells us more about Blücher than it does of Paris. He said of Paris, "Was für plündern!" We are usually only half aware of how often and how much our past individual experience affects our capacity to evaluate as well as to reason. Nor do we always realize the subtlety of such influences; they often supply us with major assumptions that are quick and plausible but completely wrong. The physician who bases his conclusions on the experience of civilian practice can disagree both honestly and correctly with a colleague whose practice in the Armed Forces has given him a radically different experience.

Scarcely ever can one find a mountain that looks the same from the north as it does from the south. Reality is like that; it has many aspects and can only be fully portrayed by views that are not identical nor even similar, because they are views from different points of the compass. Here appears the major argument for reading; namely, that it makes available to you glimpses of truth that you have not seen. In binocular vision or a stereoscopic camera, the two images are not identical; and from the very fact

that they are not the same, a new sense, that of distance, becomes possible. The gains from reading usually come from the contrast between what the author has observed or concluded and what you have noted and inferred.

But sometimes you read about work in a field of which you have had no experience. What then? Well, rather obviously, you are in that case in need of a clear and comprehensible exposition, rather than the type Lord Balfour had in mind when he spoke of "things that would have been clearer if they had not been explained." Authors whom I find worth reading use description and narration to tell what something is, and definitions to tell what it is not. The hallmarks of a good exposition are that it translates or formulates *the less familiar into terms that are more familiar*; it translates *the obscure into the clear, the variant into the constant, the complex into the simple, the vague into the precise, forms into functions, and states into forces*.

Before expanding such a condensed statement and to anticipate your possible objection that you don't see how all this can bear upon the question of how to read medical literature, let me say that if an author follows none of these requirements in the first few pages of his article, I save a wonderful amount of time by refusing to read further. With the almost fantastic amount of reading we all should do, knowing what not to read becomes a cardinal point of progress in the general task of learning how to read. Some sort of selection is necessary, and I find that it is better to base one's reading on the quality of the author's mind than to select it on the title or the field of his experience. I would therefore suggest a few particulars to keep in mind when you start to read a scientific article.

First, an author of a scientific article fails in his purpose if he puts his ideas, even though they may be familiar to him, into terms that are quite unfamiliar to most of his readers. (There is one qualification to be made on this point that I will mention later.) I saw once in a psychoanalytic journal this statement: "Music is pure libido symbolism lacking objectification or cathexis." And some of you will remember Dr. Johnson's definition of a cough as "a spasm of the diaphragm vellicated by some sharp serosity." It is the reader's need—if not his right—to have the unfamiliar made familiar and the obscure made clear.

Another desideratum in medical literature is that the constant be shown as lying behind the variant. The capacity to detect and to convey this kind of clarification often improves as a result of some measure of sophistication in regard to the mathematics of probability. I would be glad to see solid geometry disappear from secondary and college curricula in favor of an equally rigorous study of the mathematics of probability, and would welcome

a wider acquaintance on the part of medical scientists with rhythmic and cyclical phenomena and the techniques of detecting their occurrence and their intervals. F. R. Dewey and his associates are doing pioneer work in this field that for the most part appears in "Cycles," a monthly report of the Foundation for the Study of Cycles.

The scientific mind so frequently simplifies the complex by means of a formula, that if an article you read performs exactly the opposite and makes the simple more complicated, it deserves to be regarded with suspicion. I am less certain regarding two more characteristics of a good scientific article, perhaps because they are rarely to be found, rather than because they are trivial. Indeed they are anything but trivial. When form can be translated into terms of function, or states of being into terms of forces, we are near the cutting edge of the scimitar of science.

Lastly, one of the most important functions of good medical literature is to render the vague more precise. The psychologist, E. B. Holt, said, "A word that has many connotations denotes nothing, and a word that denotes anything cannot have connotations." For example, the word water has many connotations, but  $H_2O$  denotes just one chemical compound. Experience in putting that dictum to the test has suggested to me the thesis that one of the essential differences between scientific language and literary language consists of the fact that scientists express themselves in denotative terms, and literary artists—particularly the poets—have mastered the connotations of words.

Now all these comments point to an exceedingly interesting subject, namely notational systems. Many sciences develop their own signs and symbols, and unless we become thoroughly familiar with the notational system of a particular science, we find reading it extremely tiring and are all too ready to declare that what we read as beginners fails completely to put the less familiar into the more familiar, the complex into the simple, the obscure into the clear, the connotative into denotative terms, the variant into the constant, or the vague into the precise. Getting accustomed to symbols requires much effort, but using them effectively rewards the user remarkably. For this reason, we usually do not stop to wonder whether the symbols are really adequate for their purpose, forgetting that explanations in a notational system that is not adapted to the subject to be explained become needlessly complicated and hard to grasp. Think of trying to record the operations of the Stock Exchange in musical notation! It seems to me that there are at least two fields, endocrinology and serology, where we have not yet found the right type of symbols or denotative terms for the kind of thinking that is needed.

True familiarity with the symbols involved in some branch of science serves to protect us from glibness in using them. Not



long ago Mr. Fred McNamara of the Bureau of the Budget asked me if I knew what a billion dollars was. I replied that I could write the figure and that the word billion has one meaning in Europe and quite a different one in North America, but that I really did not know what a billion dollars was, so he told me: "A packet of a thousand \$1,000 dollar bills eight inches high is a million dollars; a billion dollars is a pile of \$1,000 bills 111 feet higher than the Washington Monument." For all its precision and its effectiveness, the decimal notation tempts one to glibness—and incomprehension.

Much could be said about notational systems and how they work, but perhaps their best effect is in drawing our attention to the kind of thinking that we use in medical science. Because I believe that explicit attention to this thinking will provide the most valuable ways to read or refuse to read medical literature, I would like to explore a little further our methods of making observations and sensible inferences. Probably a brief narrative will serve my purpose.

When I was taking the introductory course in pathology in 1913, I had the good fortune to have Dr. Howard Karsner as a teacher. Dr. Karsner, then as now, could pack a formidable amount of information into a very short space of time when he lectured, and I was disturbed by my failure to write fast enough to keep up with what he was saying. One night I had the somewhat vain-glorious idea that if one Gregg could invent a shorthand system, why couldn't another? So I devised symbols for organs and organ tissues, and for such concepts as atrophy, hypertrophy, infiltration, inflammation, induration, and necrosis, and found that they covered the nouns most in use. The adjectives needed related to size, form, weight, position, staining properties, and consistency, together with such concepts as normal and abnormal, acute and chronic, rare and frequent. The adverbs referring to time (quickly or slowly), to quantity, and to frequency were the commonest adverbs used in pathology. The most commonly used verbs were: *causes* or *is caused by*, *follows* or *is followed by*, *shows* or *is found*, *is accompanied by*, *contains* or *is found in*. To my surprise and considerable interest, these nouns, adjectives, adverbs, and verbs usually conveyed a substantial part of the concepts and the statements of an introductory course in pathology.

Soon after this invigorating discovery came a haunting disappointment. Statements put into my shorthand were clear but they were not cogent. They were comprehensible but not convincing. What was wrong? The answer to that question did not come quickly, but it contained, I think, the best sieve through which to sift the first page or two of anything you read, if you want to test the author's reliability. It deals with what adjectives

and adverbs you have a right to expect in almost any serious writing in the medical sciences.

Consider the statement: "Mosquitoes transmit malaria." Of such a statement one can say that it reports a brilliant discovery and that it is profoundly true and important, but also one can say that as a statement it is distressingly unsatisfactory. What is needed are qualifying modifiers such as *all* or *some*, for both the subject and object. For the verb, such modifiers as *always* or *sometimes* may be required. Finally, the word *only* may be needed as a modifier for subject, verb, or object. When the correctly selected qualifying words have been put in, you have something cogent, resembling cabinet work rather than three logs lashed together with a liana vine. The accurate choice of the correct modifiers of the subject, verb, and object in the case of the unchallengeable statement, "mosquitoes transmit malaria," makes the final statement conclusive as well as clear. Broadly speaking, if you pick up a reprint and the subjects, predicates, and objects have no qualifiers of the above-mentioned sort, you are not in first-class intellectual company, and you proceed with the reading at your own risk. So much for the best sieve I know of for separating the wheat from the chaff in medical literature.

One of the most frequent purposes of scientific papers relates to finding the causes of some phenomenon or condition, but most medical scientists seem completely oblivious (or ignorant) of the fact that results usually come from many causes, not one. I doubt if I could exaggerate my feelings regarding the stupidity we show in so frequently assuming that one result is due to only one cause. We ought to use the word *why* in the plural and ask, "Whys is this patient in coma?" not, "Why is this patient in coma?" The next time you hear someone say anything that attributes a single cause for some event, ask yourself if he means the predisposing, the precipitating, or the perpetuating cause? And how many causes of each of these kinds are involved? A particular case of a fractured jaw in a sailor may be the result of convergent causes—no letters from home, too much alcohol, the loan of a car by a friend, a dark night, an oncoming car on a road covered with ice at a curve, the fact that the left-hand rule is used in the British Isles, new brake linings, a skid, and a telephone pole. These constitute the whys, not the why, of a fractured jaw. It is a cataract of consequences. Take out any one of these whys and the accident would not have occurred. When will we wake up to the importance of multiple causation? Some prefer to call it convergent causation. I am as sorry for those physicians who have never heard of "Occam's Razor" as I am for those who have never heard of Gillette's.

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long ago Mr. Fred McNamara of the Bureau of the Budget asked me if I knew what a billion dollars was. I replied that I could write the figure and that the word billion has one meaning in Europe and quite a different one in North America, but that I really did not know what a billion dollars was, so he told me: "A packet of a thousand \$1,000 dollar bills eight inches high is a million dollars; a billion dollars is a pile of \$1,000 bills 111 feet higher than the Washington Monument." For all its precision and its effectiveness, the decimal notation tempts one to glibness—and incomprehension.

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Whenever you hear it stated that A causes B, you can get a sort of intellectual setting up drill by saying to yourself, "I

wonder if it isn't wiser to say that B causes A?" For example, it is fairly probable that in the next six months you will hear it said that some acquaintance "has had a nervous breakdown from overwork." Ah! There is an implication that overwork has caused a nervous breakdown. How would it be to reverse the interpretation and conclude that the man overworked because of self-doubt or overconscientiousness, which are early symptoms of some kinds of oncoming nervous breakdowns? Perhaps depression or insecurity inclined him to stay at the office until a quarter of eight instead of quitting at five o'clock as he used to . . . and then to a quarter of ten, and then to midnight. And at a later stage, when he had exhausted his sense of fatigue, staying all night at work. I have found this particular form of mental gymnastics not only diverting but at times remarkably rewarding—which is more than I could honestly say of the usual kind of gymnastics.

Quite naturally, if we are unaware of the frequency of multiple causation, we are the easy victims of plausibility; we stop looking for more than one cause if the one that occurs to us seems plausible. Let me give you, to illustrate the subtle way in which plausibility can kill true curiosity, an experience that I will disguise by changing the scene to a distant city. I was attending a medical lecture in Liverpool, England, given by an Irish physician. He failed to hold my attention. I began to watch a device behind the speaker which flashed the names of doctors in the audience who were wanted on the telephone. I noted that an unusually large number of the names were Irish; 17 out of 19. Now 13 out of 19 would not have been above the probabilities of chance, but 17 out of 19 was well above being a chance event. What could explain that? Being amused by the number of plausible explanations, I listed them. Here is the list, and any one of the reasons might have seemed so plausible as to stop any further inquiry:

1. The Irish population in Liverpool is unusually large.
2. The medical profession in Liverpool contains a very high proportion of Irishmen.
3. Irish doctors are notably conscientious about keeping up with advances in medicine by attending lectures.
4. Irish doctors want to be seen attending lectures.
5. Irish doctors are unusually compassionate and ready to sacrifice even such opportunities as professional lectures to the whims of their patients.
6. Irish physicians employ nurses who need close supervision or who are excessively conscientious.
7. The patients of Irish physicians want their money's worth and are not phlegmatic or submissive.

8. The lecture hall was in the Irish sector of Liverpool.

9. Irish doctors flocked to hear the lecturer because he was an Irishman and a graduate of the National at Dublin.

10. The Irish doctors in Liverpool want their names to be better known and crave the appearance of being busy.

11. The lecture was on a disease very common among Irish people.

12. The prestige of the Irish doctors in Liverpool has become so great that English physicians are changing their names—for, mark you, all I was seeing was Irish *names*, not necessarily Irish *men*.

As a last remark on the risks of mere plausibility, let me call your attention to the fact that all these circumstances *might* have been true simultaneously.

As another example of plausibility, let us assume that a substance not frequently found in urine has been reported in one of your patients. Among the plausible explanations are: (1) It was ingested and when present is routinely excreted by the kidneys. (2) It is normally present in the blood and is usually put out only by a so-called leaky kidney. (3) It is normally stored in the bones and has been released by the ingestion of some other substance, e. g., lead released from the long bones by the ingestion of large quantities of phosphoric acid. (4) It is usually excreted by some other organ such as the lungs or the skin, but this mechanism is interfered with and the kidney takes over the task. (5) It was not ingested but is the product of faulty metabolism, e. g., an adrenal neoplasm. (6) There was another patient with the same name and the specimens were mixed.

From these examples you can see that an article in any current journal that fails to list all of the plausible explanations for an event should show cause for limiting its attention to just one of them.

Let us pass from the pitfalls of plausibility to the equally misleading failures due to an ignorance of the laws of probability. We cannot rely upon good horse sense in such matters. What do you think are the probabilities that at a dinner attended by 20 people there will be at least one pair who share the same day of the same month as their birthday? Are you surprised to know that it is better than a 50-50 chance? More precisely it is a 52.05 chance. Does that disturb your confidence in your common sense? It did mine.

The commonest failure I note in most medical articles is the assumption that in a short series of cases, say 41, a positive result in 26 is evidence of something more than chance. I can offer you in this connection a simple formula the mathematician R. A. Fisher gave me as a reliable criterion for drawing sound

inferences from small numbers, *i. e.*, a good working rule to apply. Let the total number of cases be called  $a + b$ ,  $a$  standing for the number of positives and  $b$  the number of negatives. You are reasonably safe if  $\frac{(a - b)^2}{a + b}$  equals 4 or more. Thus, in a series

of 41 cases, if 26 are positives and 15 are negatives, the result works out to only 2.9, and 26 out of 41 is not significant because it does not significantly exceed mere chance. But if there had been 27 positives and 14 negatives, then  $\frac{(a - b)^2}{a + b}$  would have

equaled 4, which begins to be significant. This formula is readily applied to many a medical report, and I have found it a valuable criterion to apply in reading case reports.

Some day you may have time to kill. Flip a penny 1,500 times and keep a record of the results. I did this once and got 755 heads and 745 tails. Very reassuring! But in that series I had one run of 12 heads in succession. Supposing that a run of 12 successive cures, or at least remissions, should be observed when first using a new drug for patients with multiple sclerosis. How could one fail to become a convert to such a drug? It is a very sobering reflection, and has led me to believe that one of the great needs of medicine, and particularly for men in research work, is a course in evidence. Intensive drill in distinguishing between hunches, surmises, varying degrees of probability, and the nature of certainty or proof could be an extraordinarily valuable experience for most of us.

One more suggestion and I am through. When a train wreck occurs, the railroad officials want to find out the whys and the hows: was it due to a defective rail, roadbed, bridge, signal, item of rolling stock, or human reaction? Now, when as medical scientists we try to keep our thinking, observations, and inferences on the right track, we too are fatefully subject to one or another kind of derailment of our reasoning. The different kinds of the derailment of reasoning deserve closer study than they are getting. Indeed, I had thought of entitling this lecture, "The Derailment of Reason," but I thought that if I could call it, "On the Reading of Medical Literature," I could interest you first in the errors of others' thinking and then you could, with these errors in mind, turn your attention in slow crescendo to the mistakes that all of us make. Moreover, a new kind of approach lies at hand. The history of medicine is loaded with false interpretations of biologic phenomena, inferences that were but derailments of reasoning. Clinical observations have been wonderfully good, in comparison to the inferences drawn. Let us study, clarify, and classify such derailments of interpretation or reasoning, in order to improve our performance in keeping on the track. For as George Santayana said, "He who is disposed to ignore history must be prepared to repeat it."

# CONCURRENCE IN PSYCHIATRIC DIAGNOSIS

WILLIAM A. HUNT, *Commander, USN*  
CECIL L. TUTTSON, *Commander, USN*

THE QUESTION of diagnostic concurrence, or agreement among psychiatrists, is one that has concerned us in our continuing study of the theory and practice of naval psychiatric selection.<sup>1,2</sup> Since the diagnostic process is basic to any selection procedure, we have considered its implications<sup>3,4</sup> and experimentally studied some of its characteristics.<sup>5,6</sup> This article compares the diagnoses given a group of recruits under psychiatric observation during basic training with the diagnoses assigned when they were subsequently discharged during later active duty. It not only studies diagnostic agreement among psychiatrists, but offers further information on the discharge channels typical of different types of psychiatric cases.

## PROCEDURE

During World War II those recruits undergoing basic training at the Newport Naval Training Center who were suspected of serious psychiatric involvement were admitted to the observation ward of the psychiatric unit for careful study before disposition. Those borderline patients considered capable of rendering adequate service were returned to active duty. Subsequently many of these received psychiatric discharges from the fleet, offering an opportunity of comparing the discharge diagnosis with that assigned on the observation ward at Newport. The present experimental sample thus consists of men diagnosed on the observation ward at Newport, sent to duty, and subsequently discharged during service with the fleet. It should be stressed that all these were borderline cases and therefore presumably more difficult to diagnose.<sup>7,8</sup> Also, the Newport diagnosis was not entered in the health record and thus could not have prejudiced the final discharge diagnosis. Moreover, the time elapsing between the original diagnosis and ultimate discharge ran in some cases to as long as three years.

Since the psychiatrists on the Newport ward were not held to any specific diagnostic nomenclature while the final fleet diagnosis had to conform to official naval nomenclature, it was felt that any comparison involving specific, detailed diagnoses would

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This study is part of a larger project being conducted through the Department of Psychology of Northwestern University, Evanston, Ill., under contract with the Office of Naval Research.



inferences from small numbers, *i. e.*, a good working rule to apply. Let the total number of cases be called  $a + b$ ,  $a$  standing for the number of positives and  $b$  the number of negatives. You are reasonably safe if  $\frac{(a - b)^2}{a + b}$  equals 4 or more. Thus, in a series

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## PROCEDURE

During World War II those recruits undergoing basic training at the Newport Naval Training Center who were suspected of serious psychiatric involvement were admitted to the observation ward of the psychiatric unit for careful study before disposition. Those borderline patients considered capable of rendering adequate service were returned to active duty. Subsequently many of these received psychiatric discharges from the fleet, offering an opportunity of comparing the discharge diagnosis with that assigned on the observation ward at Newport. The present experimental sample thus consists of men diagnosed on the observation ward at Newport, sent to duty, and subsequently discharged during service with the fleet. It should be stressed that all these were borderline cases and therefore presumably more difficult to diagnose.<sup>7,8</sup> Also, the Newport diagnosis was not entered in the health record and thus could not have prejudiced the final discharge diagnosis. Moreover, the time elapsing between the original diagnosis and ultimate discharge ran in some cases to as long as three years.

Since the psychiatrists on the Newport ward were not held to any specific diagnostic nomenclature while the final fleet diagnosis had to conform to official naval nomenclature, it was felt that any comparison involving specific, detailed diagnoses would

This study is part of a larger project being conducted through the Department of Psychology of Northwestern University, Evanston, Ill., under contract with the Office of Naval Research.

be unfair. For comparison we therefore selected the broad categories of psychoneurosis (PN) and personality disorder (PD). It would have been desirable to include a psychotic category, but all men falling in this category were automatically discharged at Newport and none were sent on to the fleet. No organic cases were included in the study. Since disciplinary and general medical discharges are also known disposal outlets for psychiatric involvement, we included such final fleet discharges in our study, hoping that interesting differences in our groups might appear. Thus, the criteria for inclusion in the sample studied were that the man must have been diagnosed on the observation ward during basic training at Newport, subsequently sent to duty, and later discharged from the fleet for psychiatric, medical, or disciplinary reasons.

The sample studied consisted of 82 recruits originally diagnosed as psychoneurotic and 213 diagnosed as having a personality disorder. As a control we included 28 men showing symptoms of psychoneurosis, such as anxiety, tachycardia, tremor, depression, et cetera, but whose symptoms were not sufficiently pronounced to permit them to be definitely diagnosed as psychoneurotic; and 62 men showing symptoms typical of the personality disorders, such as immaturity, history of many arrests, nomadism, et cetera, but who were not definitely diagnosable as such. Also included as a control were 40 men studied on the observation ward and judged to be normal.

### RESULTS

The results are presented in table 1, which gives the percentage of each original diagnostic group falling in each of the final discharge categories. Comparing the original with the final psychiatric diagnosis, we find that of all the cases originally diagnosed as psychoneurotic and subsequently receiving a psychiatric discharge from the fleet, approximately one half received a diagnosis of psychoneurosis, with the majority of the remainder being discharged as personality disorders. In view of the borderline nature of the cases and the amount of time elapsing between the original and the final diagnosis, the diagnostic agreement would seem to be fair and would indicate some efficiency in the original diagnostic performance. Some confusion obviously exists between the psychoneurotic and personality disorder categories, however. Those results are confirmed by the group which showed psychoneurotic symptoms but which could not be definitely diagnosed as psychoneurotic. Turning to the group with personality disorders, we find that approximately three quarters of those subsequently receiving a psychiatric discharge were discharged as personality disorders. Again, this is confirmed by the group with only symptoms of a personality disorder. The agreement here is certainly good. It would appear

that the diagnosis of personality disorder is a more reliable one than that of psychoneurosis, a finding that confirms those of a previous study of ours.<sup>2</sup> The personality disorders seem to be more reliably identified than the psychoneuroses.

TABLE 1. Agreement between Newport diagnoses and final discharge diagnoses

Newport diagnosis	Number of diagnoses	Discharge and outcome categories					
		PN*	PD**	PN+PD***	Other	Medical	Disciplinary
Psychoneurosis	92	27	26	1	4	7	37
Psychoneurotic symptoms	29	43	19	0	2	0	36
Personality disorder	213	0	20	2	4	41	146
Personality disorder symptoms	62	7	32	0	4	17	23
Normal controls	42	3	3	2	5	17	19

\*PN = Psychoneurosis

\*\*PD = Personality disorder

\*\*\*PN+PD = All disciplinary discharges

When we look at the other medical and disciplinary discharges, we find some interesting differences between the groups. The psychoneurotics are significantly less apt to receive a disciplinary discharge than are the men with personality disorders, who show a marked tendency to disciplinary difficulties. The psychoneurotics are even less of a disciplinary problem than the normal men. On the other hand, the psychoneurotics tend to be more of a medical problem than those with personality disorders. These findings confirm another investigation by us.<sup>2</sup> Moreover, these differences are in agreement with the clinical interpretation of the disorders and show that the psychiatric diagnosis predicts important aspects of the individual's social behavior. As would be expected by the definition of "normal," psychiatric and disciplinary discharges are relatively infrequent outlets for our normal control group.

These findings on disciplinary and medical discharges demonstrate the importance of considering these disposal channels in any study of the psychiatric serviceability of military personnel. They also raise a question concerning the study of the reliability of psychiatric diagnosis; i. e., if a recruit is diagnosed as an asocial personality and subsequently receives a bad conduct discharge, or if he is diagnosed as psychoneurotic and subsequently receives a medical discharge for some psychosomatic complaint, are not these examples of diagnostic concurrence rather than the disagreement superficially implied by the difference in the channels of disposal?

## SUMMARY

The study of a group of recruits, originally diagnosed as having psychoneurotic or personality disorders but subsequently sent to duty as borderline cases, who were later discharged from the fleet for psychiatric, other medical, or disciplinary reasons shows close concurrence in psychiatric diagnosis. As compared with the psychoneurotics, the patients with personality disorders were much more of a disciplinary problem and somewhat less of a medical problem.

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# TECHNIC OF CREMASTER MUSCLE DISSECTION IN INGUINAL HERNIOPLASTY

FELIX P. BALLENGER, *Captain, MC, USN*

THE PROPER method of dissecting the cremaster muscle when performing inguinal hernioplasty has been little discussed, yet in many cases it presents a real problem if an adequate repair is to be accomplished. In performing inguinal hernioplasties, and also when observing other surgeons performing this operation, I have noted difficulty in accurately suturing the fascis of the transversalis muscle to the shelving border of the inguinal ligament about the spermatic cord at the internal inguinal ring when the usual methods of dissection of the cremaster fibers were used. If the cremaster fibers are split in the line of their descent, or if they are allowed to continue to encircle or cover the cord structures in any manner, they will invariably obstruct the proper placement of sutures about the spermatic cord at the internal inguinal ring.

## OPERATIVE TECHNIC

In order to avoid the difficulties created by the presence of the cremaster muscle in this part of the repair, I have developed a technic for dissection in this region which completely removes the obstructions caused by the cremaster fibers, and also, in cases of recurrent hernia and large hernia, obviates excision of the cremaster in order to accomplish adequate repair. The following technic for dissection and repair of an inguinal hernia is therefore recommended, as I have used it in a large number of cases with invariable ease of suture placement and excellent results.

1. The usual inguinal skin incision is made.

2. The external oblique fascia is incised and opened in the line of its fibers into the apex of the external inguinal ring. This incision is carried about one and one-half inches above the internal abdominal ring and well down over the pubic tubercle in the external spermatic fascia.

3. The cremaster fibers are dissected free from the inguinal ligament from the pubic tubercle to one inch above the internal

## SUMMARY

The study of a group of recruits, originally diagnosed as having psychoneurotic or personality disorders but subsequently sent to duty as borderline cases, who were later discharged from the fleet for psychiatric, other medical, or disciplinary reasons shows close concurrence in psychiatric diagnosis. As compared with the psychoneurotics, the patients with personality disorders were much more of a disciplinary problem and somewhat less of a medical problem.

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## THE SHIFTING INCIDENCE OF PSYCHOSIS

Manic-depressive psychosis and general paresis are definitely on the decline since about 1935. Rates for general paresis are much higher for men than women, but the relative difference is less in recent years than formerly. Manic-depressive psychosis rates are higher for women than men. Alcoholic psychoses show, with some exceptions, a generally rising trend, with rates that are very much higher for men than women.

—SELWYN D. COLLINS, Ph. D.  
in *Journal of Chronic Diseases*  
p. 439, Apr. 1955

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FELIX P. BALLENGER, *Captain, MC, USN*

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1. The usual inguinal skin incision is made.
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3. The cremaster fibers are dissected free from the inguinal ligament from the pubic tubercle to one inch above the internal



abdominal ring (fig. 1). It is important in this dissection to see that all fibers are completely detached from the inguinal ligament.



Figure 1. Beginning the dissection of the cremaster muscle. The point of the scissors is shown under the lower edge of the cremaster; at this site the cremaster is detached from its origin.

This lower border of the cremaster is then elevated and the dissection continued to elevate the cremaster muscle in its entirety from the external spermatic fascia and underlying cord (fig. 2). The entire cremaster, including its origin from the internal oblique muscle, is then retracted upward. This exposes the spermatic cord covered by the internal spermatic fascia (fig. 2).

4. The spermatic cord and its internal spermatic fascia covering can then be dissected completely free from the floor of the inguinal canal from the internal abdominal ring to a point below the pubic tubercle. When this has been accomplished all areolar tissue is removed from the inguinal canal and its floor (fig. 2).

5. The internal spermatic fascia is then incised in a line with the spermatic cord and the hernia sac can easily be brought up, dissected out completely, its neck transfixed and ligated high inside the internal abdominal ring, the sac excised, and the stump

allowed to retract upward. If, however, a direct hernia sac is present, it can be handled by whatever method seems appropriate such as dissection, high ligation, and excision or by imbrication and infolding.



*Figure 2. The cremaster has been elevated from the cord and the cord dissected from the floor of the inguinal canal.*

6. After the sac, or sacs in the case of a "Pantaloon" type, have been adequately removed or imbricated, the repair can then be preceded with. The transversalis fascia is secured in the floor of the inguinal canal with Allis forceps, and the border of the transversalis fascia is sutured to the shelving border of the inguinal ligament with interrupted No. 00 cotton sutures (fig. 3). The sutures are placed from the medial angle lateralwards, being certain to secure the first suture into the fascia overlying the pubic tubercle. As placement of the sutures upward and outward proceeds, it becomes obvious that they can be placed on either side of the spermatic cord at the internal abdominal ring with ease without incorporating fibers of the cremaster muscle, because the cremaster and internal oblique muscles are now being retracted upward completely out of the way (figs. 3 and 4). By placing 6 to 8 sutures below and medial to the cord and 2 or 3

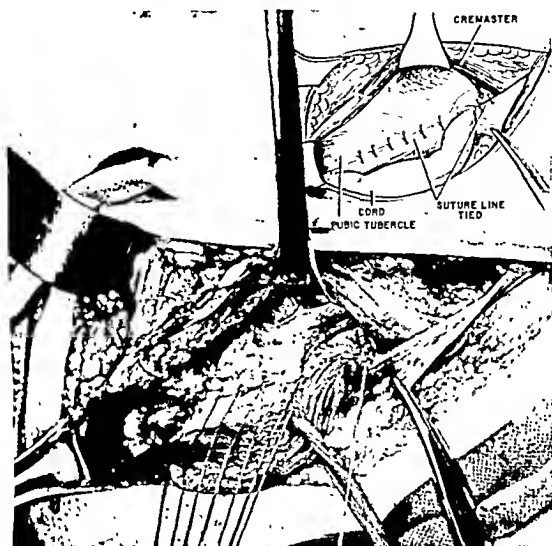


*Figure 3. Retraction upward of cremaster muscle permits easy placement of sutures in transversalis fascia and inguinal ligament.*

above or lateral to it, a snug repair around the spermatic cord usually can be obtained. In infants and children this layer of repair is not necessary and is omitted. I believe that many recurrences of indirect inguinal hernias occur because of inaccurate placement of sutures and failure to secure an adequate, snug repair about the spermatic cord. This defect can easily be avoided by using this technic of dissecting the cremaster and repairing the floor of the inguinal canal.

7. The spermatic cord is then replaced in the inguinal canal and the cremaster replaced over the cord and sutured to the inguinal ligament in its normal anatomic relationship (fig. 5). However, if it is thought desirable, the cord can be transplanted completely to the subcutaneous tissues in the Halsted repair. If the cord is replaced in the canal and the cremaster sutured over it as above described, the external oblique fascia and external spermatic fascia are then closed with interrupted No.

0000 cotton sutures and the subcutaneous tissue and skin closed with the same material. If the Halsted procedure is done the external oblique fascia is sutured beneath the spermatic cord,



*Figure 4. All sutures have been tied, apposing the transversalis fascia to the inguinal ligament.*

allowing the cord to emerge through this suture line at a point about one-half to three-fourths inches internal to the internal abdominal ring. A bed of subcutaneous tissue is then sutured underneath the cord, between it and the external oblique fascia, and subcutaneous tissue and skin are closed over the cord, using No. 0000 cotton sutures throughout.

#### SUMMARY

A technic for dissecting the cremaster muscle from the external spermatic fascia and spermatic cord and retracting it upward along with the internal oblique muscle allows easier placement



*Figure 5. The cremaster has been replaced over the cord in its normal anatomic position, and is shown here with its lower border resutured to the inguinal ligament.*

of sutures in the transversalis fascia and inguinal ligament. This technic obviates the incorporation of the cremaster fibers in the suture above and lateral to the spermatic cord and, I believe, makes a more accurate and stable repair of this portion of the inguinal canal floor.

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*The specialist is a man who fears the other subjects.*

—Martin H. Fischer

# ADVANCES IN TRAINING THE NEUROPSYCHIATRIC TECHNICIAN

DENNIE L. BRIGGS, *Lieutenant, MSC, USN*  
NORMA R. WOOD, *Lieutenant, NC, USN*

**C**HANGING technics in the treatment of hospitalized psychiatric patients have necessitated a reassessment of the role of the nursing staff. In the past, members of the nursing staff usually considered their primary duties to be providing the custodial and housekeeping aspects of patient care, and the patient was allowed little opportunity to assist in his own treatment. Today, however, their responsibilities are centered mainly about providing an atmosphere conducive to treatment, and their duties include working with patients to a greater degree. The importance of interpersonal relations in treatment is increasingly recognized and fostered in hospitals using social psychiatric technics.

We feel that although the roles of the psychiatric nurse and the corpsman are not yet fully defined, steps should be taken to provide a continuing educational program that will give them every opportunity to learn more of treatment procedures, interpersonal relations, and the dynamics of their own personalities, and to share in developing their own niche in the treatment program. It was believed that existing educational opportunities needed revision in the light of recent developments in other hospitals and of our own experience in operating an acute admissions ward without use of restraints and with only occasional use of sedatives.<sup>1</sup>

In a period of 10 months, approximately 1,000 patients were admitted to the acute admissions ward of this hospital, and it was not found necessary to put any patient in a seclusion room.<sup>2</sup> However, due to the fears and anxieties of various staff members, patients were put in the quiet rooms on five occasions. In order to operate such a unit, it becomes necessary to revise traditional methods of training and to provide means whereby corpsmen can learn to recognize and handle their own anxieties.

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From U. S. Naval Hospital, Oakland, Calif. Lt. Briggs is now assigned to the U. S. Naval Hospital, Navy 3923, FPO, San Francisco, Calif.

## CURRICULUM

The curriculum of the Neuropsychiatric Technicians School at this command has been previously described by Kahn.<sup>3</sup> This school was established during World War II when emphasis was placed on screening out obvious psychiatric misfits and on the survey of those who had psychiatric breakdowns while on active duty.<sup>4</sup> The training included highly specialized procedures such as deep insulin coma and electroconvulsive therapy and made much use of didactic lectures dealing with theories concerning the dynamics and treatment of specific mental disorders. Although there was occasional use of "milieu therapy" and brief psychotherapy, the psychiatric service and the course of instruction for technicians was primarily oriented toward physical treatment and various other suppressive and repressive techniques such as sedation and restraint. In a period of less than two years the orientation changed to one in which relationship therapy was stressed on all wards, even those with acutely disturbed patients.<sup>5</sup> The transition was not always an easy one, and it involved a major reorganization of the course of instruction in the school.

Formalized didactic lectures, we found, contributed to a certain kind of defensiveness on the part of the corpsman which often made him feel extremely uncomfortable, as though he was expected to interpret psychological material to the patient. As his training was not adequate for this, he many times found himself in an extremely frustrating situation and often resorted to suppressive measures designed to control his own anxiety rather than that of the patient. This, too, was a result of his earlier medical training in which he was taught to regard the patient as a semi-invalid whose treatment involved active physical measures.

The new student has many preconceived ideas as to the nature of mental illness, the role of the technician, and exactly what composes psychiatric treatment itself. Two of our students have vividly pointed out some of these misconceptions and have shown the importance of working with the feelings and attitudes of the staff as well as those of the patient.<sup>7-9</sup>

One problem with which we were particularly concerned was the corpsmen's lack of participation in the patients' groups and in the ward staff meetings, and their failure to attend psychiatric staff meetings. We became convinced that, rather than stimulating them, we were contributing to their anxiety by creating an atmosphere in which they thought they had to know more than was actually expected of them.

Recognizing these needs, we instituted some time ago a weekly group discussion with the students held by a psychiatrist and

a psychologist, and more recently by the nursing supervisor, the chief of nursing service of the hospital, and a psychologist. We were rewarded by evidences of the students' growth, demonstrated by their increasing ability to express some of their feelings and anxieties. Frequently students, after working at other activities, have written us that they considered this experience to be one of the most valuable in their training.

### COUNSELING PROGRAM

When the student begins his training program he is assigned to a psychiatrist on the staff for counseling purposes. If the student was formerly on the staff of this hospital, he is allowed to choose the physician he would like to work with. Students are given appointments for an initial interview; additional appointments are up to the student and the psychiatrist. In some instances students have been introduced to individual psychotherapy, which has lasted throughout their stay at this hospital and has been continued with civilian therapists after the student's release from service. These instances are most encouraging, because when the student realizes he has personal problems to cope with and seeks help with them, he is in a better position to work with patients and with staff members. The nursing instructor acts as an educational counselor as well and assists the students with their anxieties regarding their work. When educational problems become mixed with emotional difficulties, the student is encouraged to discuss these with his therapist.

More recently we have introduced two other teaching methods that have aided considerably in helping the student to take a more active part in the treatment program.

### "BIG BROTHER" PROGRAM

We felt that the student needed to know patients as human beings rather than as disease entities and decided to try assigning each student a patient early in his training. The student preferably first sees the patient on one of the admissions wards and follows him throughout his stay in the hospital. He sees the patient as often as his schedule and own interest will allow with the purpose of getting to know him and finding out all he can about him. Sessions are provided for discussion of the patients, and the students are encouraged to keep notes of their contacts. At the end of the course, they prepare a summary of their impressions of the patients. Several of the patients have made marked improvement, which has served as a most effective demonstration to the student of the real value of relationships in treatment. The student provides the patient with a healthy model to identify with and feels no pressure to "treat" the patient.

At the students' request, we have modified our teaching program to include an hour per day of group discussion held by vari-



ous staff nurses to deal with the daily anxieties aroused in caring for patients. These hours have proved to be extremely rewarding, and a great deal of discussion ensues, often prolonged beyond the assigned time.

Students have chronically complained that they do not feel part of the service, and we have found that we have inadvertently contributed to this feeling by not giving them certain rights and privileges which are accorded even the most inexperienced and untrained staff members. We have taken steps to make the student feel more a part of the psychiatric service by affording him wherever possible the same opportunities as a permanent staff member. We have held seminars twice a week for the entire staff that provide an opportunity for continual growth for everyone as well as indoctrination of new staff members, and that allow as little distinction between student technicians and others as possible. We believe this will contribute greatly to the therapeutic atmosphere of the service as a whole and will result in even better patient care than in the past.

We believe that the success of methods in the newly emerging field of social psychiatry in mental hospitals justifies looking into our traditional teaching and ward management procedures and at this time see two main areas in psychiatric nursing and treatment which should be developed further.

### SOCIAL THERAPY

The idea of the social therapist originated with Dr. Maxwell Jones and his work at the Social Rehabilitation Unit at Belmont Hospital in England. Here, young girls with various backgrounds are taught how to care for psychiatric patients in a relatively short period of time while working as members of the staff. They remain in the unit for only six or eight months and yet achieve a remarkably high degree of therapeutic skill. They attend a series of seminars dealing with normal growth and development given by a permanent staff member and have additional opportunities to learn about interpersonal relations in their daily contacts with patients. Their daily instruction periods enable them to deal with their own anxieties and curiosities when these are most meaningful; thus their training helps them to cope with their own problems while aiding in the treatment process. Their primary role is relating to patients and encouraging them to communicate their feelings to others in order that they may be understood and helped by other staff members and by the other patients. Pressure is thus not exerted on them to interpret psychological material.<sup>10</sup> This orientation away from interpretation is an extremely important one, as we have pointed out.<sup>11</sup>

## WARD MANAGEMENT

It follows that when free communication is developed and social anxiety is lessened, both patients and the staff feel less pressure, and a truly therapeutic community can emerge. *The degree of behavioral change possible within relatively short periods of time in such an atmosphere is limited only by the abilities of the staff to share in the communication process.* The results of this kind of treatment are evident even in the chronic behavior and character disorders<sup>12</sup> where social rehabilitation is accomplished sometimes in four or five months, in persons with life-long histories of great maladjustment, as well as in the debilitating neurotic disorders. One frequently hears staff members comment on the "quietness" of their ward or group, as if this were the criterion of successful treatment. Use of sedatives and restraining techniques in the past created a sense of security in the staff but seldom considered the welfare of the patient.

It appears that when communication among members of the staff and between staff and patients is improved, the running of the ward itself becomes therapeutic, as the patient more and more participates in his own treatment. The staff must be able to give up some of their functions without guilt and of necessity have to "unlearn" many aspects of their roles. It is accomplished informally by dealing with anxieties as they arise.

Treatment, as we see it, consists of providing the patient with healthy people as models for his own behavior and of working out means for constant communication of his feelings to others. By healthy people we mean real people—each with his own individuality, anxieties, and interests, but free to express these qualities rather than allow them to interfere in his relationships with others. Communication increases the ability to tolerate others and to relate to them in a realistic manner, thereby decreasing the likelihood of having to act out impulses and feelings. All relationships in the hospital then become potentials for therapy if skill in using them is developed.

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### DENTAL HYGIENE AND SEX

"The real test of a patient's patience is the dental chair. Here a patient, no matter how calm he pretends to be, signals his tension by slight psychomotor movements which the dentist can detect. And, according to a dental survey made, appropriately, by *Dental Survey*, women make better dental patients than men. As a matter of fact they also take better care of their teeth generally. It seems that in pre-adolescence, little boys consider any type of washing—whether in the mouth or behind the ears—a feminine frill. Worse than that, they believe that a defiance of mother's instructions to wash the teeth, is a symbol of manliness. Then through certain psychiatric mechanisms, not to be disclosed in this family periodical, the growing boy carries this low opinion of dental hygiene right into adult life. The adolescent may slick down his hair and clean his fingernails while preparing for a date; but he apparently feels no need for washing in places where the fruit of his industry is not so visible. To the girl, on the other hand, cleanliness and body care seem to be basic virtues. All of which may account for the fact that women are better patients than men. Or are they?"

—EDITORIAL  
in *Journal of Medical Society*  
of New Jersey, p. 443, Sept. 1955

# ACUTE SUPPURATIVE ARTHRITIS OF THE HIP IN CHILDREN

JAMES B. JONES, *Captain, USAF (MC)*  
REGINALD C. RAMSAY, *Captain, USAF (MC)*

**A**CUTE suppurative arthritis is not uncommon, and in any medical facility where a large number of sick children are treated it can be anticipated that a few patients will develop a pyogenic infection of a joint. The pathogenesis is similar to acute hematogenous osteomyelitis, the bacteria being blood borne from some primary focus of infection. The offending organisms are staphylococcus, streptococcus, pneumococcus, *Hemophilus influenzae* bacillus, gonococcus, meningococcus, and occasionally coliform bacteria.<sup>1</sup> Any of the larger joints may be affected, but, except for gonococcal arthritis, as a rule only one of them is involved. With the present widespread use of antibiotic drugs for the treatment of primary infections, such as boils, acute tonsillitis, and otitis media, many cases of acute suppurative arthritis are either prevented or are aborted before clinical recognition is possible. When an acute inflammatory process does involve a joint, it is easily detected by signs of increased local heat, redness, swelling, tenderness, and pain on motion. However, when the hip or spine is involved the clinician must rely on more subtle findings because of the larger amount of surrounding soft tissue.

Suppurative arthritis of the hip, if neglected, has disastrous sequelae. The capitular epiphysis of the femur may be destroyed, and it is common for the hip to become dislocated.<sup>2,3</sup> In other cases the articular cartilage may be destroyed, resulting in either fibrous or bony ankylosis in a position of deformity.<sup>4-6</sup> It is therefore highly desirable that the diagnosis of acute suppurative arthritis of the hip be established early in its course, so that effective therapeutic measures may be instituted before irreversible changes in the joint structures can ensue.<sup>5</sup> The purpose of this article is to discuss methods of early recognition of acute suppurative arthritis of the hip and to present two illustrative cases.

## SIGNS AND SYMPTOMS

The diagnosis should be considered in any child who has a fever, develops a protective limp, and refuses to walk or to move about normally. A history of a preceding febrile illness is common, or the child may still be suffering from an infection. There may be a relationship to trauma, and this is apt to be misleading. Any trauma would direct attention to the painful part but probably does not play a significant role in the pathogenesis. The patient will be irritable and restless, and will cry, especially with any movement. Inasmuch as any motion may be transmitted to the affected hip joint, it will be difficult for the parent and for the examiner to ascertain the site of the pain. A child of three years of age or older may be able to indicate the location of his difficulty, but if this is not the case, the physician must rely on careful observation and examination.

The capsule of the hip joint is more relaxed in the flexed, abducted, externally rotated position (the so-called "frog position"). If there is increased fluid within the joint the child will automatically tend to hold his leg in this position (fig. 1A). Any motion which will tighten the capsule and decrease the space will produce increased tension within the joint and accentuate the pain. The most important clinical finding, therefore, is the observation that the child is more comfortable with one hip held toward the frog position. With the hip supported in this position the other joints of the lower extremity can be examined without unduly upsetting the child (fig. 1B). It is especially important to rule out any disease in the knee joint. The simultaneous examination of both hips is most satisfactory (fig. 1C). By grasping the knees, the hips are held in the frog position and gently abducted and extended. Reflex muscular resistance will be detected on the affected side and the child will cry out. An uninvolved hip joint can be moved without resistance and without pain. In addition, it may be noted that tenderness on palpation is present over the hip joint.

These findings are indicative of increased fluid or synovial thickening within the hip joint. In children, several conditions can produce these changes. Nonspecific synovitis of the hip is the most frequent differential diagnosis to be considered. With nonspecific synovitis, not a well-understood clinical entity, the child usually does not have a fever, although frequently it occurs following a febrile illness. There is a protective limp and guarding of the hip. The signs and symptoms are not alarming and last for only a few days. One wonders if some of these cases might not be actual abortive bacterial infections.

Identical to nonspecific synovitis is the early stage of Legg-Calvé-Perthes disease, which cannot be definitely diagnosed until roentgenographic changes can be demonstrated in the capit-



Figure 1. (A) Frog position of the right hip. (B) With the hip held in the frog position, the other joints of the lower extremity can be more easily examined. (C) Simultaneous examination of both hips is most satisfactory.

ular epiphysis of the femur.' It is for this reason that all cases of nonspecific synovitis should be followed carefully and repeated roentgenographic studies made if there is persistence of any signs or symptoms referable to the hip joint. Tuberculosis, which can simulate an acute pyogenic infection, may be most difficult to rule out, and one must rely on the laboratory for final proof. Also to be considered in the differential diagnosis are rheumatoid arthritis and rheumatic fever.

Roentgenograms of the hips should be obtained in every suspected case. The capsular outline is frequently visible and, if more prominent or bulging on the affected side, is of diagnostic significance. One should also look carefully for the appearance of widening of the joint space (fig. 2). Any osseous involvement may be indicative of an osteomyelitic process.



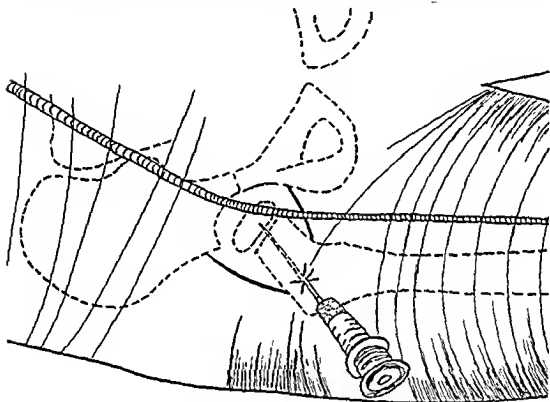
*Figure 2 (case 1). The initial roentgenogram of the hips showed widening of the joint space on the right. This is highly suggestive of increased fluid within the joint. The capsular outline cannot be visualized.*

Routine laboratory studies will usually reveal a polymorphonuclear leukocytosis, although this finding was not present with one of our patients. It is to be expected that the erythrocyte sedimentation rate will be elevated.

#### ASPIRATION OF THE HIP JOINT

Although the diagnosis may be suspected from the foregoing, it cannot be established without aspiration of the hip joint. Not only is aspiration diagnostic, but it also is an all-important therapeutic step. Smear and culture of the joint fluid will prove or disprove the presence of a pyogenic infection, and antibiotic sensitivity studies will guide the physician in his therapeutic program.

Aspiration of the hip joint is not difficult, contrary to common opinion, and when the joint is distended with fluid, is surprisingly easy. The following method is recommended. The skin and subcutaneous tissue lateral to the femoral pulse and parallel to the prominence of the greater trochanter are infiltrated with one of the local anesthetic agents such as procaine hydrochloride or Xylocaine Hydrochloride (brand of lidocaine hydrochloride). A long 20- or 21-gage needle on a syringe filled with the local anesthetic agent is then directed toward the hip joint, keeping in mind that the head of the femur is directly beneath the femoral pulse and that the needle must angle superiorly to correspond to the normal angle produced by the neck of the femur (fig. 3).



*Figure 3. The approach for needle aspiration of the hip joint.*

When the needle encounters the anterior hip capsule, there is increased resistance to its insertion. By injecting small quantities of fluid, it can be determined when the hip joint has been entered. The joint space will accommodate only 1 or 2 ml of fluid, and the fluid will return into the syringe. It must be emphasized that if fluid does not return to the syringe the point of the needle does not lie within the hip joint. Frequently, if there is increased fluid within the hip joint, it will appear in the syringe as soon as the needle pierces the capsule. Before withdrawing the needle, it is wise to inject penicillin solution into the joint if there is any suspicion that a pyogenic infection is present.

All material obtained from the joint should be sent to the bacteriology laboratory for routine smear and culture. Specific ant



biotic sensitivity studies should be made. An immediate smear of the fluid may not only show the presence of pus cells, but may give an indication of the nature of the offending organism. One of the antibiotic drugs should be administered, although the culture and sensitivity studies may suggest changing to another drug at a later date.

It is beyond the scope of this article to discuss in detail the treatment of suppurative arthritis of the hip. However, in our opinion, the infection can be adequately controlled in most cases by specific antibiotic drugs if the diagnosis is established and effective drugs instituted early in the course of the disease. Surgical intervention can be held in abeyance until the efficacy of treatment with antibiotics alone can be determined. Open drainage is not to be condemned but should be used only if truly indicated.

### CASE REPORTS

**Case 1.** A three-week-old male infant was admitted to this hospital because he had had fever, been irritable, and had not moved his tight leg for one week. At the time of admission the infant cried constantly, especially on being moved about. Both hips were held flexed and externally rotated in a frog position. There was definite resistance to manipulation of both hips. However, the left could be brought to a more neutral position whereas there was increased resistance to extension of the right hip and the slightest attempt caused him to cry out. There was a one-degree temperature elevation. The white blood cell count on admission was 17,950 per  $\mu$ l with 51 per cent neutrophils and 49 per cent lymphocytes. Roentgenograms of the hips showed the appearance of widening of the joint space on the right (fig. 2).

The day following admission to the hospital the tight hip joint was aspirated. One milliliter of purulent fluid was obtained. Before withdrawing the needle, 450 mg (750,000 units) of crystalline penicillin G was injected into the joint space. Immediate smear of the fluid showed the presence of gram-negative intracellular diplococci. Two hundred and ninety-seven milligrams (300,000 units) of procaine penicillin G was administered intramuscularly twice daily for three days and then once daily for eight days. There was an obvious immediate improvement noted following the aspiration, and continued gradual improvement. At the time of discharge, 12 days after admission, the infant was actively moving both his legs and both hips could be brought to a neutral position without resistance.

Since discharge from the hospital the patient has been a healthy, normal appearing infant. Roentgenograms of the hips taken at age six months showed normal development of both hips.

Because of the nature of the infection the mother was examined. Urethral smear disclosed gram-negative intracellular diplococci. Treatment for her infection was therefore instituted.

**Case 2.** A three-year-old girl was admitted to this hospital because of pain in the right lower extremity and a protective limp. Two weeks prior to admission she had had an upper respiratory infection which resolved spontaneously. Her mother stated that four days before admission the child fell, following which she would not use her right leg when walking, and she ran a low-grade fever. The mother believed that the source of her child's difficulty was the right knee.

On admission to the hospital the child had a rectal temperature of 101°F. There was a marked protective limp on the right and the child held her right hip partially flexed and externally rotated. There was tenderness and muscle spasm about the right hip joint, and any attempt to extend and internally rotate the hip caused the patient to cry out with pain. The white blood cell count was 13,200 per  $\mu$ l with 24 per cent neutrophils and 66 per cent lymphocytes.

The initial working diagnosis was synovitis of the right hip with rheumatic fever or rheumatoid arthritis to be excluded. Roentgenograms of the hips were negative. The erythrocyte sedimentation rate was 44 mm pct hr, and C-reactive protein was 2 plus. Other laboratory tests, including antistreptolysin titer, blood culture, and an electrocardiogram were within normal limits. Two days after admission to the hospital salicylate therapy was instituted but the patient continued to have a temperature elevation ranging between 100° and 101°F, and no improvement in the hip was noted.

On the sixth hospital day the right hip joint was aspirated and 2 ml of slightly cloudy, straw-colored fluid was obtained. Before withdrawing the needle, 600 mg (1,000,000 units) of crystalline penicillin G was injected into the hip joint. Fifty milligrams of Terramycin (brand of oxytetracycline hydrochloride) was administered intramuscularly three times daily. The day following the aspiration the child's temperature spiked to 102°F and then she became afebrile. There was an immediate improvement in the child's clinical course.

The growth on the culture of the joint fluid was alpha hemolytic streptococcus, which was most sensitive to tetracycline and Chloromycetin (brand of chloramphenicol) and less sensitive to Terramycin and penicillin. Two hundred and fifty milligrams of tetracycline four times daily was given orally and the Terramycin was discontinued.

The patient continued to improve and on the 15th hospital day she was walking with only a slight limp. The tetracycline was continued for two weeks after the child was discharged. Clinical and radiologic findings of the right hip two months later were completely normal.

### SUMMARY

The early recognition of acute suppurative arthritis of the hip is essential to avoid its disastrous sequelae.

The physician should become suspicious of this condition from the history of fever and voluntary protective immobility of the

hip. The patient often will maintain the involved hip in flexion, abduction, and external rotation ("frog position"). Widening of the joint space or bulging of the capsular outline may be noted on routine roentgenograms of the hip.

Nonspecific synovitis, rheumatic fever, rheumatoid arthritis, and tuberculous hip disease must be considered in the differential diagnosis.

The definitive diagnostic procedure in septic arthritis of the hip is aspiration of the hip joint. This should be performed in every suspected case. Bacteriologic examination of the joint fluid may reveal the specific pathogenic organism. Antibiotic sensitivity studies will guide the therapeutic program. The removal of purulent fluid from the joint space and the instillation of an antibiotic agent, such as penicillin, is highly beneficial until specific therapy may be started after completion of sensitivity studies.

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#### VALUE OF PERSEVERANCE

"It is, however, a serious fault in a research worker to be too ready to drop problems as soon as he encounters a difficulty or gets seized by enthusiasm for another line of work. Generally speaking one should make every effort to complete an investigation once it has been started. The worker who repeatedly changes his problem to chase his newest bright idea is usually ineffectual."

—W. I. B. BEVERIDGE

*The Art of Scientific Investigation*,  
W. W. Norton & Co., New York, N. Y.,  
1950. p. 131



## Clinicopathologic Conference

Tripler Army Hospital, APO 438, San Francisco, Calif.\*

### PROGRESSIVE DYSPNEA

**Summary of Clinical History.** A 34-year-old electrician and painter of Portuguese extraction was admitted to the hospital complaining of shortness of breath on exertion for one month.

Except for a marked susceptibility to colds, he said he had been in good health up to three months before admission, when he noted intermittent frontal headaches and some generalized muscle aches lasting for one month, and began to cough up small amounts of greenish sputum. One month before admission he noted dyspnea on exertion, which gradually increased in severity and was associated with some weight loss and fatigability. From onset of symptoms to admission, he had lost about 25 pounds. Two weeks before admission he first noted wheezing over the upper right side of his chest, as well as hoarseness and night sweats. He denied chest or abdominal pain, orthopnea, hemoptysis, chills, allergies, nausea, vomiting, jaundice, diarrhea, dysuria, or ankle edema. His past medical history revealed few of the usual acute childhood infections. He had gonorrhea at the age of 23 and a fractured foot 4 years later. He had been discharged from the Army 5 years before for psychoneurotic symptoms. He had had no medication except for routine treatment of his colds, no tobacco, and just an "occasional" beer.

There was no known exposure to tuberculosis or coccidioidomycosis. Six months before admission the patient had a routine chest roentgenogram taken which he was told was normal.

\*Brig. Gen. John F. Bohlender, MC, USA, Commanding General. From the Laboratory Service, Col. Harold E. Shuey, MC, USA, Chief.

**Physical Examination.** The patient was a well-developed, chronically ill male in no acute distress. His temperature was 99.4°F; pulse, 80; respirations, 26; blood pressure, 126/84 mm Hg. Examination of the eyes, ears, nose, and throat was negative. Examination of the lungs revealed impairment to percussion over both bases anteriorly and posteriorly. The diaphragm moved freely. There was increased fremitus over the right lower chest. Fine inspiratory rales and intermittent wheezes were heard over both bases anteriorly and posteriorly. The heart, abdomen, and neurologic systems were negative on examination.

**Laboratory Studies.** Red blood cells numbered 3.6 million per  $\mu$ l. The hemoglobin measured 10.2 g per 100 ml. There were 10,200 white blood cells per  $\mu$ l with 61 per cent neutrophils, 30 per cent lymphocytes, and 4 per cent eosinophils. The erythrocyte sedimentation rate was 32 mm per hour, corrected (Wintrobe). Blood chemistry studies revealed the following: serum alkaline phosphatase, 10.4 Bodansky units; serum acid phosphatase, 1.5 King and Armstrong units; serum inorganic phosphorus, 4.4 mg per 100 ml; and serum calcium, 11.4 mg per 100 ml. The cephalin-cholesterol flocculation test was negative. Serologic examination of the serum revealed a negative Kahn test and no cold agglutinins. The urinalysis was negative, with no Bence-Jones protein. The sputum was very scanty, and no acid-fast bacilli were found on repeated smears and cultures. Gastric washings were also negative for acid-fast bacilli. Skin tests with coccidioidin and histoplasmin and a PPD (second strength) tuberculin test (on two occasions) were negative. A third tuberculin test was reported as eliciting a 3-plus reaction.

Chest roentgenograms taken on admission revealed "a feathery density in each lower lung field, most marked in the medial areas. The diaphragm is not involved. The heart is not enlarged. In areas the individual densities tend to become confluent, and in the right base the possibility of honeycombing is present. The upper lung fields show no evidence of disease." Films taken two months later on the second admission showed extensive coalescence of the densities so that they became homogeneous, completely filling the lower two thirds of both lung fields from the hilum to the periphery. There was no apparent cardiac enlargement. A gastro-intestinal series and barium enema were nonrevealing.

Except for the roentgenographic findings described above, repeated laboratory tests showed little alteration during the course of the patient's illness. The serum inorganic phosphorus dropped to 3.4 mg per 100 ml. On the day before death, the white blood cell count rose to 39,800 per  $\mu$ l with 92 per cent neutrophils. No pathogenic organisms were grown on repeated cultures.

**Course in Hospital.** On the first admission the patient remained in the hospital for 29 days, when he signed his own release. He received only symptomatic treatment. During this stay he developed no new physical findings or symptoms. At all times inspiratory rales could be heard over both bases. He ran a persistent low-grade fever, never above  $100.4^{\circ}\text{F}$ , and cough and sputum were almost entirely absent.

For a month the patient remained at home. Cough and dyspnea gradually increased; weight loss and fatigue became marked.

The patient was readmitted with severe dyspnea and marked cyanosis of the skin and mucous membranes. The temperature was  $99.8^{\circ}\text{F}$ ; pulse, 120; respirations, 40; blood pressure, 124/80 mm Hg. Some clubbing of the fingers and toes was noted. The lungs showed slight dullness to percussion over both bases. Bronchovesicular breath sounds were equal throughout. There was good motion of the diaphragm. The heart was not apparently enlarged. The heart sounds were normal. The liver edge was palpable 4.0 cm below the right costal margin and was slightly tender. There were no palpably enlarged lymph nodes. The rest of the examination was essentially negative.

Since the nature of the patient's disease was not established, treatment was symptomatic. He was given penicillin and streptomycin sulfate. Despite high oxygen concentration by tent and mask, he showed marked cyanosis and dyspnea on the slightest exertion. He suffered severe aching pains across the front of the chest which were relieved by Demorol (brand of meperidine hydrochloride). No fluid was obtained at the time of a right thoracentesis attempted shortly before death. Death came quietly 73 days after the first admission.

#### DISCUSSION

**Doctor Pitts:**\* This discussion deals with a 34-year-old male who developed a relentlessly progressive illness characterized by pulmonary insufficiency, with death  $8\frac{1}{2}$  months following a report of a normal chest x-ray,  $5\frac{1}{2}$  months after the onset of symptoms, and  $3\frac{1}{2}$  months subsequent to the onset of dyspnea. Associated symptoms consisted of a low-grade cough with constitutional manifestations of low-grade fever, considerable weight loss, and progressive debility. Objective findings revealed bilateral diffuse pulmonary involvement which appeared patchy and symmetrical without hilar adenopathy on the initial chest roentgenogram. Cyanosis at rest or on the slightest exertion, refractory to oxygen therapy during the latter part of his clinical course, suggested an alveolar-capillary block in the absence of evidence compatible with a venous-arterial shunt. Laboratory findings of mild anemia and an elevated serum globulin are considered nonspecific.

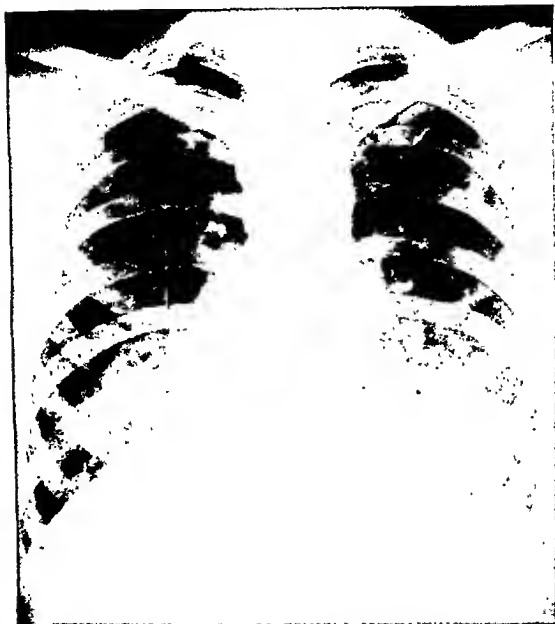
\*Maj. Forrest W. Pitts, MC, USA, Department of Medicine.

The clinical manifestations were not those of acute or chronic parenchymal suppuration or bronchiectasis, and I believe these entities may be readily excluded without further discussion. Nor does this case fit the pattern of infection due to viral or rickettsial agents. Fungus diseases such as coccidioidomycosis, histoplasmosis, and blastomycosis may appear as diffuse bilateral progressive pulmonary disease, and negative skin tests are the rule rather than the exception in the disseminated and progressively fatal forms. At this point in the discussion, serologic studies do not discourage their elimination on the basis of negative cultures, lack of extra-pulmonary involvement, and subsequent death due to asphyxia. The tuberculin conversion is difficult to explain but this finding does not fulfill the usual significance attributed to it when an attempt is made to correlate it with other key features. The only plausible explanation for an individual to die of tuberculosis with extensive pulmonary involvement, repeatedly negative cultures for *Mycobacterium tuberculosis*, and clinical manifestations of an alveolar-capillary block is that associated with the miliary form of this disease; the latter is readily excluded by the appearance and distributions of the lesions on the chest roentgenogram (fig. 1).

Other causes to be considered are obscure diffuse bilateral pulmonary diseases, including pulmonary infiltration with eosinophilia, pneumoconiosis, lipid pneumonia, lymphoma, uremia, and histiocytosis or lipogranulomatosis. These may be excluded because of the absence of expected associated findings and/or the less savage clinical course usually associated with these diseases.

Pulmonary adenomatosis (alveolar cell carcinoma, bronchiolar carcinoma) produces diffuse bilateral pulmonary lesions and an asphyxial type of death, but this condition usually runs a much more protracted course and is characterized by large quantities of clear mucoid sputum of low viscosity.

Diseases commonly associated with alveolar capillary block such as pulmonary arteriosclerosis, repeated multiple thromboses or embolization with infarctions of the pulmonary vascular bed, leukemia, sarcoidosis, beryllium granulomatosis, lymphangitic metastases, chemical pneumonia similar to that noted following inhalation of sulfur dioxide fumes, certain collagen diseases, and the type of diffuse interstitial pulmonary fibrosis described by Hamman and Rich<sup>1</sup> provide a more fruitful but difficult group to narrow down in the differential diagnosis. Cor pulmonale is common during the late stages of most of these entities, and I suspect the pathologist will find hypertrophy and dilatation of the right ventricle in this case, although little or nothing is stated in the protocol with reference to an electrocardiogram, cardiac fluoroscopy or evaluation of the cardiac silhouette in the lateral or oblique views, the presence or absence of distended neck veins, and dependent edema. Enlargement of the liver during the second hospitalization seems to be the only recorded manifestation of right ventricular failure.



*Figure 1. Roentgenogram of the chest showing bilateral feathery densities in the medial portions of the lower lung fields.*

The rapid downhill course, low-grade fever, x-ray appearance of the lesions, and lack of polycythemia lead me to exclude pulmonary arteriosclerosis. Repeated small thromboses or infarctions of the pulmonary vascular bed remain a possibility and cannot be excluded with certainty.

As an electrician, the patient may have been exposed to beryllium through contact with (now obsolete) broken fluorescent light tubes. This point in the history would be extremely important if positive, since all the features of his illness are compatible with such a diagnosis. Interestingly enough, a negative history would not exclude beryllium granulomatosis in the light of reported "neighborhood cases." However, lack of x-ray evidence of upper lobe involvement and absence



of a military type of lesion militates against this diagnosis as the most likely cause. Occupational exposure to sulfur dioxide gas as used in old refrigerators remains a less likely possibility and can be excluded reasonably well.

On the day prior to death, the white blood cell count was reported as 39,800 per  $\mu$ l with 92 per cent neutrophils. I prefer to attribute this to an agonal leukemoid reaction rather than to myelogenous leukemia. It is difficult to conceive of a respiratory type of death from leukemia, particularly so in the absence of more severe anemia, retinal hemorrhages, and splenomegaly.

Could this be an unusual case of sarcoidosis? All of the key findings—diffuse bilateral pulmonary disease, low-grade cough and fever, alveolar capillary block, elevated serum globulin, and hepatomegaly from cor pulmonale and/or hepatic involvement—are in keeping with sarcoid. Occasionally sarcoid runs a progressive, fatal course, but for death to occur within such a brief span of time makes this possibility seem improbable. Lack of hilar or extrathoracic adenopathy and/or clear-cut involvement of other tissues or organ systems also rules heavily against sarcoid as the most likely diagnosis.

Carcinomatous lymphangitic metastases to the lung from an occult primary lesion such as that which may occur in the body or tail of the pancreas, the stomach, or the bronchus would account for all of the findings in the protocol and cannot be excluded from the final differential diagnosis with complete certainty. The x-ray appearance is not that of the "sunburst" pattern, and this factor lends considerable weight against this possibility.

Of the collagen diseases, scleroderma most frequently produces an alveolar-capillary type of block. The absence of cutaneous findings and other features readily leads one to exclude the possibility of scleroderma. Periaarteritis nodosa may involve the medium-sized vessels of the lungs, subsequently producing an alveolar-capillary type of block and occasionally leading to destructive lesions in the lungs characterized by cavitation. Hypersensitivity angiitis characteristically involves the small vessels of both arteries and veins and runs a more acute course. It is not characterized by necrotizing granulomata. Hypersensitivity angiitis is usually associated with a generalized vasculitis and frequently terminates fatally from diffuse vascular involvement of uremia. A specific subtype of collagen disease was described in 1931 by Klinger<sup>1</sup> and formulated by Wegener<sup>2</sup> in 1939. This is characterized by necrotizing granulomatous lesions in the upper air passages or in the lung, as well as renal changes manifested by necrosis and thrombosis of loops or lobes of the glomerular capillary tuft. In addition, there is generalized vasculitis. In reviewing the literature to 1954, Fahey<sup>3</sup> found 22 cases of Wegener's granulomatosis in the literature and added seven cases of his own. Absence of both renal

involvement and diffuse organ or system involvement in this case tends to rule against a collagen type of disease such as hypersensitivity angitis or Wegener's granulomatosis.

In 1944 Hamman and Rich from Johns Hopkins described four cases of acute diffuse interstitial fibrosis of the lungs of undetermined cause observed from 1931 to 1943. All cases were characterized by cough, progressive dyspnea, cyanosis, and cor pulmonale. Autopsy revealed interstitial edema and hemorrhage with few leukocytes, and enlargement of the lining alveolar cells as well as necrosis of the alveolar and bronchiolar epithelium; a hyaline membrane was noted to line the alveoli, and bacteria were absent. None had vascular lesions similar to periarteritis nodosa. The most striking feature was a progressive, extensive, diffuse interstitial proliferation of fibrous tissue throughout all portions of both lung fields. The early stage was characterized by fibroblasts, and the late stages showed mature scar tissue. Survival times from the onset of symptoms varied from one to six months. The histories of Hamman and Rich's original cases are almost identical to that of the present protocol. Since the original description, a total of 27 cases had been recorded at the time Peabody and Peabody<sup>3</sup> wrote an editorial on this condition in December 1954. Eighteen of the 27 cases have been reported since 1950.

The cause of the Hamman-Rich type of diffuse interstitial pulmonary fibrosis is unknown. Suggested causes have ranged from recurrent episodes of viral pneumonia, chemical irritants and hypersensitivity, to a disturbance of fibrinolysis. Pathologic changes similar to the Hamman-Rich type of involvement have been reported with five fatal cases of interstitial pneumonia which occurred while the patients were receiving prolonged Apresoline (brand of hydralazine hydrochloride) and hexamethonium therapy. Characteristically, all cases have been resistant to therapy. Initially, it was believed that duration of life was limited to weeks or months. There are now two patients who have survived three years and a third reported in 1949 to have survived 13 years after the onset of symptoms. Corticotropin and cortisone had been used empirically with equivocal effect. One striking case demonstrated a remission coincident with the onset of administration of these agents and followed by a severe exacerbation when they were discontinued. Most authorities agree that once steroids are started they should be continued for life.

Although it is difficult to pick out any single diagnosis with certainty, I believe the over-all features of this case best fit a diagnosis of the Hamman-Rich type of diffuse interstitial pulmonary fibrosis.

Doctor Bratenahl: \* Before presenting the pathologic findings, I would like to know what further comments any of you would like to make regarding this case; in particular, any more guesses as to the most probable diagnosis. Would anyone care to comment further on the x-ray

\*Comdr. Charles G. Bratenahl, MC, USN, Naval Medical Unit, Laboratory Service.

picture (fig. 1) in this case, correlating it with the history? Might anything significant be added to the x-ray description?

**Doctor Blumley:**\* I have nothing to add to the description of the x-ray findings as given in the protocol. While beryllium poisoning has to be thought of, the patient having been an electrician, most cases of beryllium poisoning occur in factory workers making fluorescent bulbs. The roentgenographic finding in acute cases consists of widespread fine nodular infiltrations in the lung fields. With continued exposure this can go on to the chronic form of poisoning within three to four months, characterized by large granulomatous infiltrations in the lungs. Also related to his occupation as an electrician is the possibility of chemical pneumonitis by inhalation of hydrogen chloride, as electricians commonly use hydrochloric acid to clean electrical connections prior to soldering. Symptoms resulting from such exposure are headaches, substernal pains, dyspnea, and marked cyanosis—symptoms which this patient demonstrated.

**Doctor Gengerosa:**\*\* Boeck's sarcoid is at times associated with pulmonary fibrosis and active tuberculosis terminally. The latter is manifest clinically by a reversion of the tuberculin skin test from negative to positive as seen in this case. This reversion has diagnostic import, I feel. Some believe that repeated skin testing with tuberculo-protein in a tuberculin-negative individual will induce a tuberculin reaction, but Raffel<sup>3</sup> has shown that it is the waxy component, the lipid fraction of the tubercle bacillus, which is necessary in combination with tuberculo-protein to induce the tuberculin reaction. I, therefore, submit a diagnosis of Boeck's sarcoid with pulmonary fibrosis and active tuberculosis terminally.

#### Clinical diagnoses:

Undiagnosed condition manifested by bilateral pulmonary infiltrations suggestive of pulmonary adenomatosis

#### Dr. Pitts' diagnoses:

1. Hamman-Rich diffuse interstitial fibrosis of the lungs of undetermined cause
2. Terminal leukemoid reaction of the blood

#### Dr. Gengerosa's diagnoses:

1. Boeck's sarcoid, with pulmonary fibrosis
2. Active tuberculosis

#### PATHOLOGIC FINDINGS

**Doctor Brotenahl:** At autopsy the patient was a markedly emaciated 34-year-old Caucasian man. The skeletal muscles were atrophic, and there was marked lack of subcutaneous fat. Moderate clubbing of digits was noted. The heart weighed 350 grams, and the right ventricle was moderately dilated. There were 200 ml of pericardial fluid present. The heart valves were essentially normal.

\*Maj. Nelson Blumley, MC, USA, Assistant Chief, Radiology Service.

\*\*Capt. Eugene J. Gengerosa, MC, USA, Intern, Obstetrics and Gynecology Service.

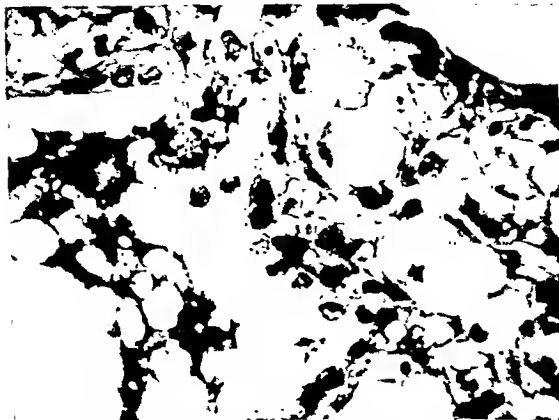
The principal findings were confined to the lungs. The right weighed 1,710 grams, the left 1,600 grams. With sterile precautions, cultures of the right lung revealed *Pseudomonas aeruginosa*. There was no pleural effusion, but fresh fibrinous adhesions covered the pleura on both sides (fig. 2). Some fibrinous adhesions were noted at the left apex. The lungs appeared heavy and solid with no crepitation at all. They had a consistency almost like liver. Cut sections revealed almost homogeneous, light gray-white, rather solid lung tissue in all lobes, particularly solid in the lower lobes (fig. 3). There was no particular odor about the tissues. On slight pressure a thick, yellowish, opaque fluid oozed from the cut surface. This material was smooth and non-granular. On dropping the lung tissues into Formalin (brand of formaldehyde solution), it was noted that this material floated to the surface as oil droplets. Oil droplets were also noted in the bloody fluid remaining in the posterior thorax after removal of the lungs.

The bronchi were mostly filled with a thick, creamy material similar to that found on compressing the lungs. Some of this material was also found in the trachea. At the apex of the left lung, a red, soft area 5 cm in diameter was found containing semiliquid necrotic material and resembling a poorly walled-off abscess. Although in general the pulmonary lobular markings and other architecture of the lungs were well preserved, no definitely aerated tissue was demonstrable on gross examination. The tracheobronchial and paratracheal lymph nodes were enlarged up to 3.0 cm in diameter (fig. 2). On cut section, they appeared homogeneous and gray-white.

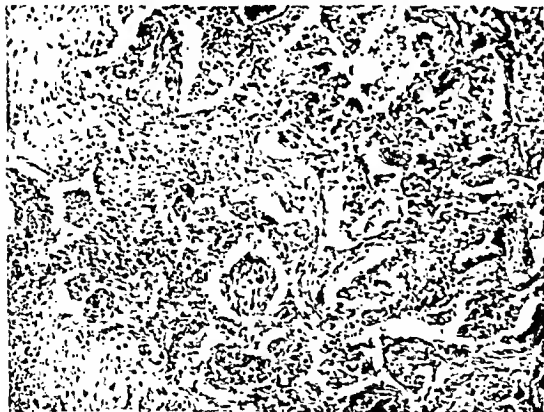
Microscopic sections of the lungs showed a heavy, acellular, fibrinous exudate on the pleura associated with some congestion. Innumerable large macrophages with foamy cytoplasm were found in the septae as well as filling many of the alveoli (fig. 4). Numerous young fibroblasts were also noted in the alveolar septae and proliferating within the alveoli (fig. 5). The alveoli in many areas had a cuboidal epithelial-cell type of lining (fig. 6). The lungs appeared very dense on all sections. Section from the left upper lobe in the area grossly suggesting an abscess showed considerable fibrosis but no distinct abscess. On hematoxylin-eosin sections, many of the alveoli were filled with a basophilic-staining, granular, amorphous precipitate in which were numerous small and large vacuoles (fig. 6). Frozen sections of lung stained with Sudan IV showed intensely red-staining oil droplets in these vacuoles and within the macrophages in the alveoli and alveolar septae. This fatty material did not stain with osmic acid and was not doubly refractile. Occasional conglomerate masses of reticulo-endothelial cells were noted in the alveoli, vaguely simulating giant cells; however, no true multinucleated foreign body giant cells were found. Sections of peribronchial lymph nodes showed the sinusoids crowded with fat-filled macrophages, which stained positively with Sudan IV and negatively with osmic acid.



Figure 2. Medial aspect of left lung showing fibrinous pleural reaction and enlarged gray-white hilar lymph nodes, Figure 3. Left lung in cut section showing uniform gray-white consolidation throughout.



*Figure 4. High power photomicrograph of lung showing vacuolated macrophages in alveoli and thickened alveolar walls. ( $\times 400$ )*



*Figure 5. Photomicrograph of section of lung showing diffuse fibrosis of alveolar walls with lipophages and proliferating fibroblast tissue in the alveoli. ( $\times 80$ )*

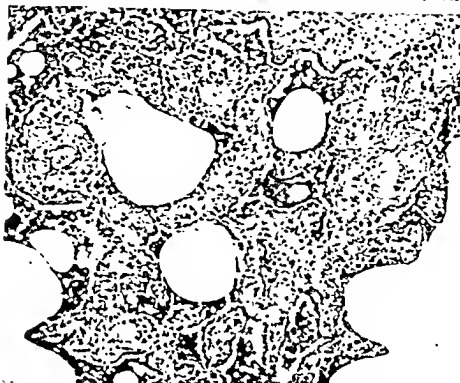


Figure 6. Photomicrograph of lung showing fibrous thickening of alveolar walls with large numbers of lipophages in the walls and alveoli, basophilic material and large and small vacuoles, and dissolved oil droplets in the alveoli. Some of the alveoli are lined by cuboidal epithelium probably derived from the bronchioles. ( $\times 80$ )

Shortly before this patient's death it was learned that, for a long unknown period of time before his first hospitalization, he had used large quantities of oily nose drops and possibly an oil-containing nose spray for his repeated head colds. He denied using any of this material after his initial admission and up to the time of his death.

The staining reaction of the fatty material found within the lungs in large quantities, positive for Sudan IV and negative for osmic acid, is consistent with mineral oil (liquid petrolatum) in contrast with vegetable and animal oils.<sup>7</sup> Some caution in strict interpretation is necessary as the Sudan IV stain is not entirely specific for mineral oil.<sup>8</sup> The pathologic findings of diffuse pulmonary fibrosis associated with large numbers of lipophages in the alveoli and interalveolar septi and the general lack of specific foreign body or inflammatory reaction are consistent with findings reported in previous cases of lipoid pneumonia due to mineral oil.

Vegetable oils, such as Lipiodol (brand of iodized poppy seed oil), sesame oil, or olive oil, usually result in little reaction of the lung tissues. These oils are slowly absorbed with little residual fibrosis. Animal oils, such as cod liver oil or halibut oil, usually cause a much

more acute reaction associated with marked fibrosis and rather striking giant cell formation in a few days. The latter type of lipoid pneumonia occurs mostly in infants, and there is usually a history of attempting to force a sick child to swallow cod liver oil against his will, possibly by holding his nose. If his reflexes are weak from illness, he tends to gag and aspirate considerable oily material. Although the reaction is quite severe, it is frequently self-limited.

Lipoid pneumonia resulting from liquid petrolatum is more often found in adults, usually elderly, and as a result of using oily nose drops. Characteristic pathologic findings consist of lipophages in the alveoli and alveolar walls surrounded by a fibrous reticulum, filling much of the air spaces and tending to concentrate in the bases of the lungs posteriorly. The elderly patient has usually employed the oily nose drops or sprays over a long period of time. When x-rays show a picture suggesting a low-grade bronchopneumonia in the bases that does not resolve and that is associated with almost no symptoms, the possibility of lipoid pneumonia should be considered. Death usually results from a secondary infection, and the diagnosis is rarely made before death. The sputum may occasionally show lipophages, but this finding is not very helpful since they may be found in various other conditions. The lungs usually appear yellowish and solid, and usually there is an absence of pleural exudate or adhesions. The fibrinous pleural exudate present in this case and the high globulin and alkaline phosphatase values reported here are puzzling features not completely explained. Are there any other questions?

Doctor Pulaski: I believe some of you may be interested in a case very similar to the one presented in this Clinicopathologic Conference. It was reported by Stanley<sup>9</sup> in 1947. This was a case of pyocyaneus pneumonitis associated with lipoid pneumonia in a 73-year-old Caucasian man. He had suffered with recurrent sinusitis over a period of 16 years, and it was believed that the lipoid pneumonia resulted from his use of oily nose drops. In his case the pyocyaneus pneumonitis was much more extensive and the lipoid pneumonia much less so than in our present case. He died on the sixth day after admission. Since primary pneumonitis due to *Bacillus pyocyaneus* is a relatively rare occurrence, the interesting thought occurs as to a possible relationship between the lipoid pneumonia and pyocyaneus pneumonitis.

#### Pathologic diagnoses:

1. Lipoid pneumonia, secondary to the use of oily nose drops
2. Terminal pneumonitis, due to *Pseudomonas aeruginosa*

\*Lt. Col. Edwin J. Pulaski, MC, USA, Assistant Chief, Department of Surgery.

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#### ON DROWNING

"If a victim has flooded his lungs with fresh water and yet has been successfully resuscitated then it would appear certain that he would be suffering from plethora, haemodilution, electrolyte disturbance, and pulmonary oedema. Further, he would be in danger of severe renal damage from the presence of freely circulating haemoglobin. Substitution bleeding with electrolyte correction, treatment for acute kidney damage, and oxygen therapy for pulmonary oedema and lung flooding would seem to be indicated. Hypotonic saline and oxygen therapy may be of help in those saved from salt-water drowning. The almost complete absence of any clinical reports of patients requiring and receiving such treatment in the vast medical literature of today can hardly be due to a deliberate silence on this subject, and it is difficult to avoid the sinister interpretation that such syndromes probably do not exist and that the aspiration of any marked quantity of water into the lungs is fatal."

—K. W. DONALD, M. D.  
in *British Medical Journal*,  
p. 157, July 16, 1955

## MILITARY OTOTOLOGY AND AVIATION MEDICINE

FRANK A. PERRI, *Lieutenant Colonel, USAF (MC)*

**D**URING 15 years as a physician with the Air Force, I have been impressed by the number of medical officers who are not fully aware of the important and close association of ear disease with military aviation medicine. Perhaps this is because many otolaryngologists are not flight surgeons and many flight surgeons have not made a special study of otolaryngology.

Both groups are faced repeatedly with otologic conditions that require immediate therapy in order to maintain trained crew personnel at peak performance. Many an otologic problem even seems to mean the end of the flying career of a highly proficient pilot, when in reality it is an easily repairable defect that should be only temporarily incapacitating. Conversely, there are minor conditions which can become irreversible and may well end a flying career if proper precautionary steps are not initiated immediately. Into another class fall the seemingly harmless diseases of the ears, nose, and throat which require that immediate steps be taken to remove crew members from flying status for the safety of all concerned.

## BAROTITIS MEDIA

Barotitis media (aero-otitis media) is an acute inflammation of the mucosa of the middle ear caused by trauma to the mucosa from inequality of pressure in the middle ear and external auditory canal. If left untreated, the disease may progress to serious complications. Because of negative pressure in the middle ear, the blood vessels undergo rapid dilatation. Failure to ventilate the middle ear at this stage further results in an intense congestion of the tympanic membrane and an actual ecchymosis of the membrane and middle ear cavity. The membrane often ruptures when the pressure in the middle ear is rapidly reduced while the eustachian tube is closed. Prolonged negative pressure in the middle ear produces transudation of a yellow serosanguineous fluid into the middle ear cavity and the mastoid air cells. This transudate then becomes infected, leading in various cases to acute suppurative otitis media, acute or chronic suppurative or nonsuppurative mastoiditis, acute or chronic eustachian salpingitis, or destruction of the tympanic membrane with loss of hearing in the involved

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From U. S. Air Force Hospital, Sampson Air Force Base, Geneva, N. Y. Col. Perri is now assigned to U. S. Air Force Hospital, Chanute Air Force Base, Rantoul, Ill.

ear. In clinical practice, all of these conditions have been seen as a result of untreated or insufficiently treated barotitis media.

The prevention of complications and the maintenance of crew personnel in constant flying readiness depends upon immediate and proper therapy. Crew personnel should be instructed in the early recognition of this condition, and should adopt prophylactic measures, as follows:

1. In the presence of acute inflammatory conditions of the upper respiratory tract, no matter how mild, crew personnel should not be permitted to fly.

2. When descending from high altitudes, the oxygen mask should be removed at altitudes of less than 10,000 feet. Personnel who have been breathing pure oxygen at high altitudes for a considerable period may develop ear distress from two to six hours after descent, particularly if oxygen is breathed until ground level is reached. This is caused by absorption of oxygen from the middle ear in the presence of eustachian tube obstruction.<sup>1</sup>

3. Upon the onset of barotitis media during flight, ascent to a higher altitude should be made immediately, followed by a slow descent while attempting the Valsalva maneuver.

4. If the condition persists, crew personnel should report to the unit surgeon immediately after landing.

**Diagnosis.** When the condition has progressed until the middle ear is filled with fluid, diagnosis and therapy become major problems. The diagnosis can be made upon the history, by inspection of the tympanic membrane, and by insufflation of the middle ear if required. In the history, the patient will usually mention one or all of the following symptoms: loss of hearing or muffled hearing, fullness in affected ear, "water in ear," and tinnitus. The examiner usually sees a slight retraction and yellowish tinting of the tympanic membrane, with redness at the periphery of the membrane and along the handle of the malleus. A fluid level and/or bubbles of air may appear in the middle ear cavity. If the whole middle ear is filled with transudate, no fluid level will be seen and the middle ear must be insufflated in order to view air bubbles and establish the diagnosis.

**Therapy.** When transudate is not present, therapy consists of reducing congestion and pressure differences between the middle ear and the atmosphere. The first is done by applying a copious spray of a one-quarter of one per cent solution of Neo-Synephrine Hydrochloride (brand of phenylephrine hydrochloride) to the mucosa of each nasal fossa. A cotton-tipped metal applicator soaked in a 5 per cent solution of cocaine hydrochloride is applied to the orifice of the eustachian tube on the affected side for five minutes.

A eustachian tube cannula is then placed at the orifice of the tube, and air is introduced at a pressure of from 3 to 4 pounds. The Toynbee diagnostic tube that connects the ear of the patient to the ear of the flight surgeon indicates the instant that air reaches the middle ear, restoring its normal physiology.

When transudate is present, it must first be aspirated. A 3-inch-long, 22-gauge spinal needle with a short bevel, attached to a tuberculin syringe, is introduced into the middle ear through the most inferior posterior portion of the tympanic membrane, and the fluid is aspirated slowly. No anesthetic is required, as very little discomfort is experienced. The nasal mucosa is then constricted, the orifice of the eustachian tube cocaineized, and the middle ear insufflated as previously described, in order to remove any remaining transudate. This therapeutic procedure reduces the period of convalescence from 21 to 5 days. The perforation of the tympanic membrane is completely healed within 48 hours, and seldom is there a recurrence of the transudate after the pressure on both sides of the tympanic membrane has been equalized.<sup>1</sup>

## TRAUMATIC CENTRAL PERFORATIONS OF

### TYMPANIC MEMBRANE

Central perforations of the tympanic membrane are distinguished from peripheral by the fact that the whole rim of the perforation is within the tissue substance of the membrane, inferior to Shrapnell's membrane, and not in contact with the bony annulus tympanicus. This type of perforation occurs in crew members during rapid descent in flight or in altitude chambers, and during and after acute infections of the nose and throat.

That traumatic central perforations do persist and often resist nature's efforts to heal them is all too manifest in the practice of clinical otology, but with adequate therapy, this need not occur. There also is no dispute that certain central perforations do produce a loss of hearing and subject the middle ear to a chronic suppurative infection followed by more severe complications; however, Adams<sup>2</sup> reported a series of cases in which there was successful healing of these perforations along with eventual return of hearing in the affected ear as proved by audiometric study.

If the examining physician finds that a central perforation of the tympanic membrane has not initiated its own healing process within 48 hours following trauma, the flight surgeon should then take the proper measures to close the perforation.

**Therapy.** The following therapy, which has proved successful in a number of our cases, is performed on an outpatient basis while the crew member is on a nonflying duty status:

After bilateral audiometric study, the whole rim of the perforation, plus a small portion of the outer surface adjacent to the rim, is touched with a small amount of very compact absorbent cotton that has been placed on the end of a copper applicator and moistened at the tip with 50 per cent trichloroacetic acid. This is repeated twice weekly, depending upon the membrane response, for at least eight weeks. In many instances there will be a rapid response to therapy, in which case the strength of the trichloroacetic acid is decreased and the solution applied only once each week. A second audiometric study is made after the perforation has healed.

### BAROSINUSITIS

The paranasal sinuses present a condition in flight similar to that of the middle ear, except that their orifices, when not closed by mucosal congestion, are fully patent and rigid at all times. Mucosal congestion will prevent an exchange of air and pressure between the paranasal sinuses and nasal fossa during descent from altitude, with the result that pain in a sinus will be experienced because of the pressure inequality. Transudation and secondary infection may follow.

The flight surgeon can alleviate the discomfort and pain of barosinusitis by inserting a pledget of absorbent cotton soaked in 0.25 per cent Neo-Synephrino Hydrochloride in and around the middle meatus. The pledget is left in place for five minutes. If the condition is not relieved after this period, the procedure is repeated. After the second application, it will be noted that the nasal mucosa has reached maximum vasoconstriction, both nasal airways are patent, and the pain and discomfort have disappeared because the sinal pressure is atmospheric. A roentgenographic study is made in order to rule out pathologic conditions of the sinuses. The patient is then placed on a solution of 0.25 per cent Neo-Synephrino Hydrochloride solution and instructed to use 10 drops of the solution in each nostril while in the head-low (Proetz) position.

### SUMMARY

The important role of ear disease in aviation medicine has not been sufficiently emphasized. Proper care and disposition of many aviation patients depend on thorough knowledge of diagnostic criteria, treatment, and prognosis of ear disorders.

Barotitis media may be diagnosed from the history, from inspection of the tympanic membrane, and by insufflation of the middle ear if necessary. If there is no transudate in the middle ear, therapy consists of reducing congestion at the nasal end of the eustachian tube and equalizing the pressure on the two sides of the tympanic membrane. If a transudate is present, these measures must be preceded by aspiration. If inadequately treated, barotitis may result in permanent hearing loss.

Traumatic central perforation of the tympanic membrane in my experience has healed most rapidly if treated with topical applications of 50 per cent trichloroacetic acid.

The paranasal sinuses may react to pressure changes in a manner similar to the middle ear, if their orifices are blocked by mucosal congestion. Barosinusitis responds well to treatment with topical vasoconstrictors.

These three seemingly minor otolaryngologic conditions may attain extreme importance when they occur in flying personnel. When not treated promptly and adequately, they cause the loss of highly trained personnel.

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#### THE PHYSICIAN AS AN INDIVIDUAL

"It is axiomatic that treatment must be individual and will vary from patient to patient. But what is true of the patient is also true of the doctor. The resourceful physician presumably will not attempt to follow unquestioningly any fixed school of teaching. Medical education does not standardize the personality of the doctor. Each will and should have his own manner of dealing with patients, developing a flexible psychotherapeutic technique best suited to his own nature."

—C. B. FARRAR, M. D.  
in *Canadian Medical Association  
Journal*, p. 256, Feb. 15, 1956

# DENTAL EXAMINATIONS OF 8,139 ARMY RECRUITS

## Preliminary Report

ROBERT W. HOBSON, *Lieutenant Colonel, DC, USA*

**P**ERIODICALLY, members of the U. S. Army Dental Corps have been asked by various organizations for information concerning the dental status of Army recruits. Prior to this study no compilation of information was available on which to base an adequate reply.

### METHOD

Examinations were conducted in all of the six Army Areas during the months of April and May 1955. Every third enlisted man within the category of recruit or separatee who reported to the dental clinic was examined. By distributing the examination points throughout the United States and by examining every third individual within the specified time, sufficient randomness was obtained to give the results validity.

For the purpose of this study, a recruit was defined as "an inducted or enlisted man without prior military service." A separatee was defined as "an enlisted man who has completed not less than 20 and not more than 24 months of service."

Although the examination form used (fig. 1) admittedly has its limitations, it was considered desirable to employ a form from which all information could be transcribed to a single IBM punch card. The fact that spaces for recording are limited on such a card imposed a limitation on the number of questions that could be answered. Under part 8b, the clinical examination was to include bitewing roentgenograms. In part 12 (prosthetics), the extractions needed as well as missing teeth and unserviceable dentures were to be reflected under the column headed "needed." The numbers in the columns in this part were for coding purposes only, and were to be disregarded by the examining officer.

This preliminary report includes only the recruits examined. No analysis has been made of the geographic distribution of this

group of individuals, or of their dental classification. The information derived from those two parts of the study will be reported at a later date.

DENTAL EXAMINATION FOR STUDY OF DENTAL REQUIREMENTS										REPORTS CONTROL SERVICE MED-DET-122																													
1. FROM (Name of Station)										2. DETERMINATION OF (Check one) <input type="checkbox"/> INSPECTED OR ENLISTED <input type="checkbox"/> REPAIRED																													
3. LAST NAME - FIRST NAME - MIDDLE INITIAL					4. SERVICE NUMBER					5. AGE (Last Birthday)					6. RACE (Check one) <input type="checkbox"/> WHITE 121 <input type="checkbox"/> NEGRO 121 <input type="checkbox"/> OTHER 121																								
7. STATE FROM WHICH ENTERED SERVICE (Check X)																																							
ALA	AKA	ARIZ	ARK	CALIF	C-2	C-3	C-4	CON	DELA	FLA	GA	ILL	IND	IOWA	KAN	MICH	MINN	MISS	MO	N. Y.	OHIO	OKLA	PENN	RHODE	S. C.	TENN	TEXAS	VIRG	WASH	WISCONSIN	WYOMING								
61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92								
8. DENTAL CLASSIFICATION										9. CLINICAL EXAMINATION - CLASS (Check one) <input type="checkbox"/> I <input type="checkbox"/> II <input type="checkbox"/> III <input type="checkbox"/> IV																													
10. MISSING TEETH										11. EXTRACTIONS NEEDED																													
LOCATION					NUMBER					LOCATION					NUMBER																								
12. TOTAL TEETH MISSING										13. TOTAL EXTRACTIONS NEEDED																													
a. ANTERIOR - UPPER										a. ANTERIOR - UPPER																													
LOWER										LOWER																													
b. POSTERIOR - UPPER										b. POSTERIOR - UPPER																													
LOWER										LOWER																													
14. FILLINGS										15. PROSTHETICS																													
TYPE					PRESENT					NEEDED					TYPE					SERVICEABLE					UNREPAIRABLE					NEEDED									
a. CLASS I															UPPER - MOLE					0					0					0									
b. CLASS II (Two surfaces)															MOL					1					1					1									
c. CLASS III (Three or more surfaces)															PARTIAL					2					2					2									
d. CLASS IV															LOWER - MOLE					0					0					0									
e. CLASS V															FULL					1					1					1									
f. CLASS VI															PARTIAL					2					2					2									
16. DEFECTIVE FILLINGS (Number)										17. BRIDGES (Number)										18. PARTIALS (Number)										19. CROWNS (Number)									
20. PERIODONTITIS (Check one) <input type="checkbox"/> NONE 121 <input type="checkbox"/> SLIGHT 121 <input type="checkbox"/> MODERATE 121 <input type="checkbox"/> SEVERE 121										21. BRITENESS NEEDED (Check one) <input type="checkbox"/> NO 121 <input type="checkbox"/> YES 121																													
22. REMARKS																																							

DA FORM 8-253 (Rev. 1-55)

CPB 43852

Figure 1. Examination form for dental evaluation.

## RESULTS

Of the 8,139 recruits examined (table 1), 7,889, or 97 per cent, were in the group aged 17 through 26 years. It is this age group that is of most interest, because selective service at present



draws mainly from the group aged 18 through 26. From table 1 it can be determined that the 7,889 recruits aged 17 to 26 years required 38,137 restorations involving 57,267 surfaces, or an average per man of 4.8 restorations involving 7.3 surfaces.

TABLE 1. *Restorations needed by 8,139 recruits*

Age	Number of recruits	Number of restorations needed	Number of surfaces	Average number of restorations needed	Average number of surfaces involved
16	4	20	24	5	6
17	879	5,446	7,642	6.20	10.15
18	1,410	7,119	10,688	5.05	7.25
19	1,604	7,022	11,229	4.88	7.64
20	1,442	7,225	11,118	5.01	7.75
21	985	4,906	7,137	4.98	7.28
22	486	2,187	3,249	4.50	6.72
23	372	1,388	2,038	3.73	5.50
24	286	1,160	1,711	4.06	6.01
25	247	983	1,423	3.98	5.79
26	178	681	1,006	3.83	5.67
27	92	314	455	3.41	5.01
28	78	313	460	4.01	5.77
29	39	122	163	2.82	3.95
30-48	37	131	200	3.54	5.41
Total	8,139	39,017	58,543	4.8	7.2

In the assessment of defective fillings (table 2), the examining officer was cautioned to count only those restorations where caries had reoccurred or the material had broken, badly washed, or loosened for some unknown cause. Even with these criteria, it was found that approximately one out of four recruits needed a defective restoration replaced.

The impossibility of rehabilitating patients dentally, with the present dentist-troop ratio, can readily be seen from table 3, which shows that for every four recruits, one bridge is needed.

The tremendous amount of time required for this type of treatment precludes its being rendered except when it is needed in the anterior portion of the mouth.

TABLE 2. *Defective fillings present on examination*

Age	Number of recruits	Number of defective fillings
16	4	
17	879	121
18	1,410	313
19	1,604	485
20	1,442	418
21	985	294
22	486	135
23	372	69
24	286	92
25	247	70
26	178	36
27	92	19
28	78	23
29	39	9
30-48	37	18
Total	8,139	2,102

The number of missing teeth (table 4) per recruit is 3.93, and the number of extractions needed averages 0.8 per individual. This does not take into consideration extractions that may be required when operative procedures are attempted or when prosthetic work is started.

A reflection of this total (4.73 missing teeth, when extractions are completed) can be seen in table 5, which lists the dentures needed. The results of this examination show that for every 100 recruits, 19 dentures of all types are required.

Table 6 reveals that 22 per cent of the recruits were in need of periodontal treatment of some degree, and that 45 per cent were in need of a prophylaxis.

TABLE 3. *Bridges present on examination, and number needed*

Age	Number of recruits	Status of dental bridges		
		Serviceable	Unserviceable	Needed
16	4			
17	879	6	1	200
18	1,410	24		314
19	1,604	38	1	414
20	1,442	34	1	420
21	985	33		264
22	486	22	2	101
23	372	15		77
24	286	19	2	66
25	247	15	1	55
26	178	4		37
27	92	5		11
28	78	2	1	16
29	39	5		15
30-48	37	6	2	1
Total	8,139	228	11	2,004

### DISCUSSION

A review of the literature<sup>1-5</sup> along with personal correspondence was made in an attempt to arrive at the probable number of new carious lesions per year in the recruits examined. The first large scale compilation that could be found was done by Hollander and Dunning,<sup>1</sup> who reported an annual increment of 1.75 new carious surfaces per person. Klein<sup>2</sup> found that in the young adult or college freshman age group, an annual increment of about 1.5 could be expected. Arnold, Dean, and Singleton<sup>3</sup> found an annual increment of 2.2 new carious surfaces per year. Examination of a group of freshman college students in Des Moines, Io

TABLE 4. Teeth missing and extractions needed

Age	Number of recruits	Missing teeth				Extractions needed				Average teeth missing per recruit	Average extractions needed per recruit
		Anterior		Posterior		Anterior		Posterior			
		U	L	U	L	U	L	U	L		
16	4	1		9	11					5.25	
17	879	165	36	1,785	1,880	73	13	365	461	1.36	1.04
18	1,410	252	72	2,351	2,455	99	19	497	658	3.79	.90
19	1,604	440			2,100	138	32	519	607	3.65	.81
20	1,442	350			2,184	100	21	499	583	3.71	.83
21	985				1,719	69	5	285	411	4.50	.78
22	486				822	33	10	138	122	3.77	1.7
23	372			35	659	11	17	76	98	3.03	1.1
24	286			196	509	13	6	65	78		1
25	247			465	540	15	10	53		1.6	.74
26	178		18	381	396	6	1	47		4.94	1.3
27	92		19	221	228	8		34	27	5.00	.75
28	78		11	202	171	17		17	29	6.15	1.1
29	39		7	94	109	1			3	5.70	1.3
30-48	37		13	106	99	3		9	5	7.80	4.0
Total	8,139	2,320	574	11,242	14,880	586	131	2,634	3,184	3.93	.80

revealed 2.2 new carious lesions per person during the first year.<sup>a</sup> In the student body at Northwestern University Dental School, the annual rate established over a period of years with radiographic examinations was 1.2 new carious lesions per year.<sup>a</sup>

TABLE 5. *Dentures*

Age	Number of recruits	Upper						Lower					
		Full			Partial			Full			Partial		
		S*	U**	N***	S	U	N	S	U	N	S	U	N
16	4												1
17	879	7	4	13	5	2	55	1	1	3	1	1	100
18	1,410	8	4	14	23	3	93	4		3	5	2	169
19	1,604	18	5	21	43	13	111	4		3	10	2	157
20	1,442	17	7	17	29	11	110	3	3	8	6		166
21	983	15	7	23	31	4	55	2	1	3	7	1	106
22	456	5	2	4	18	3	31	2	1	3	3		37
23	372	11		2	9	3	18	3		4	4		27
24	286	4		6	5	3	15	1	1	3	1		21
25	247	4	3	4	7	4	21	4		1	3		27
26	178	7		2	4		13		1	1	2	1	23
27	92	6	1	4	3		5	3			4		11
28	78	4		2	2		8	1					13
29	39		1	1	3		3	1			2		3
30-48	37	1		1	1	2	2				1	1	1
Total	8,139	107	34	109	183	48	540	29	8	32	49	8	867

\*S=Serviceable

\*\*U=Unserviceable

\*\*\*N=Needed

In view of the preceding findings, I believe that 1.5 is a conservative estimate of the annual new caries rate for recruits in the Army. This would mean a total of 3 new lesions during the 2-year obligated period. Added to the average number of restorations needed on induction, it can be seen that the average young man of draft age, during his 2-year period in the Army, would require the insertion of 7.8 restorations if he were to be discharged in a caries-free condition.



revealed 2.2 new carious lesions per person during the first year.<sup>1</sup> In the student body at Northwestern University Dental School, the annual rate established over a period of years with radiographic examinations was 1.2 new carious lesions per year.<sup>2</sup>

TABLE 5. Dentures

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		S*	U**	N***	S	U	N	S	U	N	S	U	N
16	4												1
17	879	7	4	13	5	2	55	1	1	3	1	1	100
18	1,410	8	4	14	23	3	93	4		3	5	2	169
19	1,604	18	5	21	43	13	111	4		3	10	2	157
20	1,442	17	7	17	29	11	110	3	3	8	6		166
21	985	15	7	13	31	4	55	2	1	3	7	1	106
22	486	5	2	4	18	3	31	2	1	3	3		37
23	372	11		2	9	3	18	3		4	4		27
24	286	4		6	5	3	15	1	1	3	1		21
25	247	4	3	4	7	4	21	4		1	3		27
26	178	7		2	4		13		1	1	2	1	28
27	92	6	1	4	3		5	3			4		11
28	78	4		2	2		8	1					13
29	39		1	1	3		3	1			2		3
30-48	37	1		1	1	2	2				1	1	1
Total	8,139	107	34	109	183	48	340	29	8	32	49	8	867

\*S=Serviceable

\*\*U=Unserviceable

\*\*\*N=Needed

In view of the preceding findings, I believe that 1.5 is a conservative estimate of the annual new caries rate for recruits in the Army. This would mean a total of 3 new lesions during the 2-year obligated period. Added to the average number of restorations needed on induction, it can be seen that the average young man of draft age, during his 2-year period in the Army, would require the insertion of 7.8 restorations if he were to be discharged in a caries-free condition.

TABLE 6. *Extent of periodontitis found and prophylaxis needed*

Age	Number of recruits	Periodontitis				Prophylaxis needed	
		None	Slight	Moderate	Severe	Yes	No
16	4	4					4
17	879	714	96	55	14	351	528
18	1,410	1,109	178	102	21	609	801
19	1,604	1,265	215	94	30	686	918
20	1,442	1,139	185	93	25	596	846
21	985	781	110	71	23	454	531
22	486	360	76	35	15	220	266
23	372	295	48	26	3	163	209
24	286	192	48	32	14	152	134
25	247	179	36	24	8	136	111
26	178	108	32	30	8	109	69
27	92	64	11	13	4	56	36
28	78	49	13	13	3	54	24
29	39	26	8	1	4	22	17
30-48	37	23	6	8		24	13
Total	8,139	6,308	1,062	597	172	3,632	4,507

## SUMMARY

An examination of 8,139 recruits from all six Army Areas was conducted in order to determine the dental status of this group of young men. During a two-month period every third recruit reporting to the dental clinic was examined, and the results were recorded on a standard form.

For the average recruit, 4.8 restorations involving 7.2 surfaces were needed. One out of every four individuals needed a defective filling replaced, and one out of every four was in need of a bridge. The average recruit was missing 3.93 teeth with 0.8 extractions indicated. This did not include extractions needed for the construction of prosthetic appliances or where it was found impossible to render restorative treatment. For each 100 recruits, 19 dentures of all types were needed. Twenty-two per cent of all



patients examined had some degree of periodontal involvement, and 45 per cent were in need of a prophylaxis.

A review of the literature indicates that a caries expectant rate for each individual of 1.5 new lesions per year would be a conservative estimate. Coupled with the need for dental treatment observed in the average recruit, this means that during his two-year period in the Army, the average young man of draft age would require the insertion of a total of 7.6 restorations to discharge him in a caries-free condition.

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"Nevertheless, in most cases of furring of the tongue the cause of the furring is probably to be found in one of three conditions: local infection, a dry mouth, or the irritant effect of tobacco smoke. Local infection may come from the mouth itself (as in stomatitis), or from the nose or throat (as in tonsillitis, colds, and sinusitis), or from the lungs (as in bronchitis and pneumonia). Dehydration of the mouth may result from a general state of dehydration, or from the dry mouth of a fever, or from blocked nose, and smoking presumably acts by the direct irritant action of tobacco smoke on the tongue."

—I. S. L. LOUDON, B. M.  
in *British Medical Journal*  
p. 20, Jan. 1956

# MARITAL ADJUSTMENT PROBLEMS IN AN OVERSEAS THEATER

## Psychiatric Implications

JOHN W. BURKETT, *Major, MC, USA*

**T**HOSE who deal with emotional problems often need to be reminded that psychiatric patients cannot be considered as isolated cases or disease entities. They must be evaluated and understood in terms of their interpersonal relationships and of how their emotional difficulties affect not only themselves but others. To represent them as decompensations without reference to their current interpersonal relationships is of limited value in practical management.

Meaningful or positive interpersonal relationships such as close friendships, family ties, and good marital bonds constitute the foundation of mental health. They promote individual security and enable individuals to form group identities. Such factors are of recognized value in helping to sustain the soldier or officer in peace or combat. An impairment or paucity of such meaningful interpersonal relationships may result in loss of emotional support and consequent neurotic attempts to solve emotional problems.

The family life of both enlisted and officer personnel is often of primary importance in determining emotional adjustment. A careful evaluation of family life may reveal the dynamics of an otherwise obscure psychiatric disorder. It may be useful or even indispensable to interview and evaluate the wife and sometimes the children of the serviceman or officer with psychiatric symptoms. Conversely, when wives or children come to the psychiatrist for consultation, an evaluation of the emotional status of the husband is frequently indicated. The value of taking special note of current interpersonal relationships is well recognized by psychiatrists, but may be overlooked by other medical officers. Failure to take the patient's total current behavior into consideration often results in an inaccurate diagnosis and consequent improper management of the case.

This article emphasizes the need for taking all interpersonal relations of the patient into consideration, with special emphasis on marital adjustment, and points out the importance of this concept in an overseas theater, where marital problems appear to be more frequent than in the United States. It is believed that there was an actual increase in the more serious types of marital difficulties among military personnel in overseas theaters during the past few years, and the absence of the usual civilian physicians and ministers, to whom people with marital problems often turn, tended to increase the number of such cases encountered.

### DISRUPTIVE FACTORS

Overseas service presents unique factors which one would expect to increase general family problems, in particular marital difficulties. The most obvious of these is the usually long separation of the husband from the family. The necessity for the entire family to adjust to a foreign culture that is obviously different in language and customs and subtly different in attitudes and philosophy also plays a causative role. The anxieties of being in a potential combat zone tend to be displaced onto other situations and to exercise an adverse effect on family life. Children are faced with the emotional stresses incident to changing schools and forming new friendships when they arrive overseas. In the younger children the absence of the father for a significant period of time almost always causes some emotional problems. The presence of relatively large numbers of unmarried women with a low standard of living increases the possibility of marital infidelity with its consequent detrimental effect on family life.

Many of the officers and noncommissioned officers who were sent overseas during 1951 and 1952 had been recalled from the reserves and were faced with their second major disruption of family life within a few years. The availability of domestic help tended in many instances to decrease positive activity and to create leisure time that housewives were not equipped to use constructively. Family life for the husband in the combat unit was even more difficult. His intensive field training resulted in frequent and prolonged separations from his family even after they arrived overseas.

It is probable that all these and many other factors were operative in creating unique problems which in many instances resulted in marital tensions. This does not imply that severe marital difficulties were universal, for in most instances these problems were met realistically and an adequate adjustment made.

### LEGAL COMPLICATIONS

In cases of definite marital discord, legal and administrative red tape created additional problems. Legal separation was impossible, and return of the family to the United States might take

many months of endeavor. Temporary separation, which at times may help marital problems, was almost impossible. In a number of instances husbands who frankly admitted having girl friends continued to live with their families. This created an obviously impossible situation for the wife. She was put in the position of having either to report this situation to her husband's commanding officer or to attempt to ignore his conduct. Bringing the husband's actions to the attention of his commanding officer would probably result in disciplinary action in the form of a fine and thus result in a financial loss to the family. Attempting to ignore his conduct was rarely a satisfactory solution. The husband, if a noncommissioned officer, was usually reluctant to move out of his family quarters because it would result in forfeiture of his coveted permanent pass and seriously interfere with his romance.

### ANALYSIS OF CASES

The frequency of marital adjustment problems is reflected in this study of 173 dependent wives who were seen for psychiatric evaluation at an Army hospital in the period June 1953 to June 1954. Of these, 31 had serious marital problems in which at least one partner contemplated divorce, the wife contemplated return to the United States, or the husband was openly unfaithful. None of these 31 wives were psychotic, but all gave indications of previous emotional instability, neurotic symptoms, or severe dependency needs.

Of the dependent wives evaluated there was a higher ratio of hospitalizations (18 out of 31) than normally occurs in psychiatric practice. This is probably due to the fact that outpatients were usually from the local area served by the hospital, while most of the hospitalized patients were transferred from other hospitals. Many of these patients had been treated unsuccessfully with various medications; often they had not confided in the medical officer who first saw them, nor had he asked them about their general life adjustment.

### CASE REPORTS

The following cases illustrate the effects of severe marital problems.

**Case 1.** The 41-year-old wife of a Sergeant was admitted to the closed psychiatric ward because of sudden and complete amnesia. She stated that she did not remember her identity or any of her past life, and did not recognize her husband. Her husband stated that just prior to the onset of her symptoms she "became cold as ice and shook all over." When the husband was interviewed, he was at first guarded and stated that nothing unusual had happened recently and that he could think of no emotional disturbances in the home. With encouragement, however, he disclosed that two days prior to the onset of his wife's amnesia he had told her he wanted a divorce in order to marry a European girl. He

had previously hinted at his dissatisfaction with their marriage, and had made little effort to conceal his interest in the other woman. The patient had refused to discuss the problem with him.

During the interview, the husband frankly stated that he had fallen in love with the other woman and had no intention of trying to continue his marriage. He did, however, express some guilt in relation to his wife's illness and said that he would take no further action until she was well. Questioning revealed that he was influenced by the other woman's ability to make him feel important.

The patient's past history revealed a lifelong pattern of passivity, dependency, marked feelings of inferiority, and severe sexual conflicts. Although she had had no previous psychiatric hospitalizations, she had experienced a period of amnesia lasting several hours at the port of embarkation just prior to going overseas. It was subsequently learned that she had been uncertain about joining her husband because of his apparent indifference to her joining him, as reflected in his letters. She had previously been married, as had her present husband, and had three children by her first marriage. She married her present husband two years prior to his going overseas, largely because of economic insecurity.

She had complete amnesia and perplexity on admission to the hospital, but recalled all events following her entry. There was no indication of psychotic behavior or thought content.

During the first three days of her hospitalization she gradually recalled a few things about herself, among them her first marriage but not her present one. She also recalled some details of her early childhood. For several days she made no further progress despite daily psychotherapeutic interviews and strong suggestion. During intravenous administration of Amytal Sodium (brand of amobarbital sodium) she was able to recall all the details of her present marriage. This was accompanied by considerable emotional display. Following the interview she was tearful, depressed, and anxious. As she responded to psychotherapy, she was discharged and followed as an outpatient. She eventually was able to face her marital problem without recourse to neurotic symptoms.

*Comment.* This patient was a very dependent person who was unable to bear the thought that her husband wanted to divorce her, because it threatened her self-esteem and created feelings of helplessness. Her symptom of amnesia was clearly a rather poor defense against the anxiety that the conscious realization of her problem would create. Although the amnesia cleared after the administration of Amytal Sodium, it was followed by anxiety and depression.

*Case 2.* The 30-year-old wife of a Captain brought her 7-year-old son to the psychiatric clinic, stating that he complained of abdominal pain and was nauseated and irritable. He had been referred from the pediatric clinic after thorough evaluation failed to reveal any physical

cause for his complaints. He had been given various medications without improvement. Following her description of the child's behavior and symptoms she said that she herself had lost 31 pounds. She went on to say that the child complained most when she was upset and that she felt maybe she was more in need of help than the child was. She then suddenly stated that she was very upset lately because her husband was having an affair with a girl. Her husband had told her that he planned to retire overseas and live with the girl. She had been married eight years and believed that prior to her arrival a few months ago she had had no major marital difficulties.

She appeared to be a rather insecure, passive woman, but her previous emotional adjustment had been fairly good. She gave a history of severe tension-type headaches for many years. During the interview she cried a great deal and said that she did not want to leave her husband for fear of losing his financial support and of being unable to provide for herself and her child. Her husband had stated openly and definitely that he intended to continue his affair with the girl; however, he was reluctant to apply for his wife's return to the United States because he felt that it might adversely affect his Army career.

The child was pale and timid but not severely disturbed. It was clear that he was well aware of his parent's marital difficulties and was concerned about them. The mother was seen as an outpatient several more times and finally was able to go to her husband's commanding officer and discuss the entire problem with him. The child was not seen again, but the mother reported that he had become asymptomatic. The commanding officer said she could not go back to the United States without her husband's consent, but he impressed the husband with his duty to his family and the unreality of his present attitude toward his wife, and indicated that a modification of his attitude was desirable.

*Comment.* In this case, what appeared to be a pediatric problem was only part of a generally disturbed family situation. The mother was a very dependent person and totally unable to insist that her husband discontinue his affair with the girl. She clung to the fantasy that her marriage was a success and the present affair more the fault of the girl than of the husband.

**Case 3.** The 45-year-old wife of a Captain with 17 years' service was admitted to the psychiatric section after an apparent suicide attempt with a sedative. Her husband had found her unconscious on the steps of their home on the evening of admission. According to her husband, her behavior that day had not been unusual. She had served his dinner in the usual manner and then said that she was going for a walk with the dog. Just before leaving she took eight Seconal (brand of secobarbital sodium) capsules, which she previously had been given at another medical installation because of insomnia.

Interview with the husband revealed that during their 13 years of marriage there was little real affection between them, and that he had never considered the marriage a great success. He had, however, con-

had previously hinted at his dissatisfaction with their marriage, and had made little effort to conceal his interest in the other woman. The patient had refused to discuss the problem with him.

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tinued to live with his wife since there were no actual quarrels or disagreements. Recently he had met a girl with whom he believed he was in love. Several weeks prior to his wife's suicide attempt he had openly stated that he no longer loved her and wanted her to return to the United States. She refused to do so, and he had continued to go out with the girl. During this time his wife suffered from insomnia and irritability. He realized that this was a rather unusual situation but felt that it was more convenient to live with his wife than move into the bachelor officer's quarters. One of his chief complaints about his wife was that she seldom gave him encouragement or support.

The patient's past history was characterized by chronic depression and several previous suicide attempts which had resulted in hospitalization. Her life had been rather colorless and she had few outside interests. There were no children, and neither she nor her husband particularly desired any. She felt, however, that hers had always been an "ideal marriage" and did not understand her husband's present attitude. She blamed the girl friend for her difficulties and expressed no overt hostility toward her husband. Although she was a licensed laboratory technician and had held a good position prior to joining her husband overseas, she was fearful about being without her husband's financial support. She had made no effort to seek legal advice regarding support in the event that she was divorced.

On entry to the hospital she was comatose, but completely recovered from the effects of the sedative after 24 hours. She was discharged after six days and followed as an outpatient. She was finally able to think about her future and past life more realistically and sought legal advice for her marital problem.

*Comment.* This patient's life had been characterized by denial of difficulties and repression of hostility. The marriage might have continued in much the same pattern if the husband had not gone overseas and found a woman who seemed to meet his needs.

#### DISCUSSION

Most of the cases presented a similar picture: a passive woman married to a relatively narcissistic man. The wife was unable to meet the neurotic needs of her husband. This did not lead to significant marital difficulties until the husband arrived overseas and met a woman who bolstered his self-esteem and at the same time satisfied his dependency needs. When this happened and the husband requested a divorce, the wife was totally unprepared to meet the situation in a realistic manner. In many instances the husband candidly admitted having a girl friend but continued to live under the same roof with his wife. This unrealistic and stressful situation was largely the result of the unique housing situation for dependents overseas. In all cases attempts were made to understand the personality characteristics and needs of both husband and wife, and to apply this knowledge toward improving their interpersonal relationships.

The large number of cases observed emphasized the extent of emotional disturbances in the dependent wives of servicemen and officers in an overseas theater. No attempt was made to include cases in which the marital problem was a minor one. In all these cases there was a serious marital problem, apparently directly related to the unique stresses of an overseas theater. All of the cases seen were of neurotic women whose marriages were only superficially stable or meaningful before their husbands went overseas. In those instances in which the husband deserted his wife for another woman primarily because of his own neurotic needs, he appeared to be more neurotic than the wife. It is believed that many of these marriages would have remained superficially stable had both partners remained in the United States. In some cases prompt legal separation or divorce probably would have decreased the emotional disturbance in the wife. A wife living in the same house as her husband and aware of her husband's interest in another woman is caught in an impossible situation.

The actual extent of marital problems is even more serious and widespread than would be suspected from the number of cases mentioned here. Many persons with marital problems resulting from the stresses of being overseas do not come to the attention of the psychiatrist but seek medical advice for various symptoms of anxiety. Some marital problems are never brought to the physician because of fear that the husband would be disciplined and the whole family suffer financial and other consequences.

### CONCLUSIONS

The importance of recognizing and dealing with the emotionally disturbed patient in terms of his interpersonal relationships is often neglected. This is clearly illustrated by the number of patients with severe marital problems that go unrecognized because of failure to take the patient's total life situation into consideration. Such severe marital conflicts are more likely to occur in an overseas theater and are probably aggravated by some administrative policies. There are certain unique circumstances encountered by military personnel and their families overseas which adversely affect harmonious family life in general and marital adjustment in particular. It is suggested that efforts should be made to reduce some of the unique stresses in an overseas theater. The early recognition of such cases by medical officers might also help prevent the more serious types of emotional disturbance encountered.

### SUMMARY

In one year, 173 dependent wives of servicemen were seen for psychiatric evaluation at an overseas Army hospital. Thirty-one of these patients had emotional disturbances resulting from serious marital problems.

During overseas service, unique disruptive factors increase family problems and marital difficulties in general. The medical officer must recognize the effect of these disruptive influences when evaluating emotional disturbances in military personnel overseas.

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#### STRESS AND THE MILITARY

"Men with strong passive dependency drives who have functioned efficiently in combat and were promoted rapidly find it stressful, while separated from their families, to adapt to a peace-time Army routine involving assumption of full responsibility of grade in new units.

"Peace-time assignment of career soldiers to the locale in which they first were in combat can serve as a stressful element in persons who are not emotionally mature and who hold strong negative nationalistic prejudices."

—FREDERICK A. ZEHRER, Lt. Col., MC, USA  
in *Medical Bulletin of the U. S. Army*,  
*Europe*, p. 48-49, Feb. 1956

## Lethal Midline Granuloma and Periarteritis Nodosa

BYRON G. McKIBBEN, *Colonel, MC, USA*

MILWARD W. BAYLISS, *Colonel, MC, USA*

CASES of granulomatous ulceration, having their primary site in the midline tissues of the face, usually running an indolent course, even appearing to heal at times, but eventually ending fatally, occasionally have been reported in medical literature.<sup>1</sup> Similar cases of granuloma of unknown cause were reported as far back as 1906.<sup>2</sup>

Weinberg<sup>3</sup> presented two cases of granuloma of unknown cause associated with periarteritis nodosa, in which he concluded that the vascular lesions were recent because there was no evidence of healing. He further stated that in all the cases of granuloma of obscure cause that were thoroughly studied and fully reported, periarteritis nodosa was a terminal development. In contrast to this, two of the cases inadequately studied by Williams<sup>1</sup> failed to show the lesions of periarteritis nodosa.

Wegener<sup>4</sup> described periarteritis nodosa as a common finding in patients with lethal granuloma. He believed that the condition causing the granuloma might also be the one causing the periarteritis nodosa. Gerlach<sup>5</sup> described necrosis of arterioles at the site of the Arthus phenomenon. Williams stated that this observation had been confirmed repeatedly and therefore suggested that the same necrotic vascular reaction causing Arthus phenomenon when it involves capillaries is also responsible for periarteritis nodosa when it involves somewhat larger vessels.

Williams further concluded that one of the fundamental resistance mechanisms of the animal is a typical cellular immune response, primarily vascular, resulting in the Arthus phenomenon when capillaries are involved, producing a granuloma in deeper tissues or a granulomatous ulceration if skin and subcutaneous tissues are involved; that the granulomatous ulceration has a tendency to occur in the midline of the face, but is not confined to this location; and that there is a tendency for the involvement of the larger vessels (periarteritis nodosa) to occur in the end stages of the disease.

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From Letterman Army Hospital, San Francisco, Calif. The authors are now assigned to the Tokyo Army Hospital, APO 500, San Francisco, Calif.

Kahn<sup>4</sup> suggested that the reacting areas are sites of tissue hyperimmunity where antibodies formed from insoluble globulins are in excess. During later infections these areas of hyperimmunity extract specific or nonspecific antigens circulating in the blood and localize them with the production of the necrotizing and granulomatous vascular phenomena. He further suggested that allergic persons are the ones who develop these areas of hyperimmunity. This explains the development of the Arthus phenomenon when the body is invaded by bacteria which produce little or no toxin, and also explains the occurrence of this phenomenon in the absence of specific infection in a hyperimmune person, by the activation of highly immunized areas of tissue by nonspecific, nontoxic proteins gaining entrance to the blood stream. It has been shown that necrosin, which is either a euglobulin or is associated with this fraction in exudate and is liberated by injured cells, is a toxic substance capable of causing the central necrosis.<sup>5</sup>

The experimental work of Selye<sup>6</sup> suggested a relative adrenal cortical dysfunction with excess production of the "salt-active" and relative suppression of the "sugar-active" corticoids. He found that excess sodium ion and an increased pH favor the development of periarteritis nodosa under experimental conditions, whereas elimination of sodium ion together with the giving of acidifying drugs tends to prevent its development. In 1949 Williams commented that the availability of hormones of the adrenal cortex would make possible new approaches to the study of granulomas.

Reports of cases of periarteritis nodosa responding favorably to cortisone or corticotropin began to appear in the medical literature;<sup>7,8</sup> and some related disorders, such as lupus erythematosus disseminata,<sup>9</sup> asthma, and vasomotor rhinitis,<sup>10</sup> were showing improvement on such treatment.

With evidence pointing toward a relationship between idiopathic granuloma and periarteritis nodosa, Williams and Hochfilzer<sup>11</sup> tried the effect of injections of cortisone on a patient in whom the diagnosis was idiopathic granuloma of the midline tissues of the face. While the course of the disease appeared to be altered somewhat favorably, they were of the opinion that cortisone would not prove to be a useful drug in the management of this condition, because of the slowness of healing and the unfavorable side effects, namely, interference with potassium metabolism and production of some general deterioration in the patient's condition.

In 1953 Hagans, Parry, and Markson<sup>12</sup> reported a case of lethal granuloma of the nose and face treated with corticotropin which had remained healed 7 months. Follow-up, 22 February 1956, revealed that the patient had required no further treatment and

had remained entirely well.<sup>11</sup> Full evaluation of this treatment however, awaits its use in more cases.

Early reports on the treatment of disseminated lupus erythematosus and polyarteritis nodosa with cortisone and corticotropin were optimistic, but it became apparent that the treatment was supportive only, and in no sense curative of the disease.<sup>12</sup>

Malkinson and Wells<sup>13</sup> reviewed the therapeutic results of adrenal steroids on polyarteritis nodosa and in conclusion stated that corticotropin and cortisone were the most effective agents for the treatment of this condition, despite serious disadvantages; that their use must be weighed carefully in each instance, and that one may expect the best results in a relatively young patient in whom treatment is started prior to the development of extensive visceral lesions and continued with proper dosage long enough for abatement of abnormal signs, symptoms, and laboratory findings.

The treatment of lethal midline granuloma remains obscure, and because of the rarity of this condition, it is not believed that a clear-cut regimen can be outlined in the near future. Until this condition is better understood, and in view of its apparent close causative relationship to polyarteritis nodosa, it is suggested that measures which are found to be of value in the latter condition also be tried on lethal granuloma, and that when cortisone or corticotropin are proscribed, they be given in accordance with the principles suggested by Malkinson and Wells.

### CASE REPORT

A 33-year-old white housewife was first seen in the ear, nose, and throat clinic of a U. S. Army hospital in Germany, 6 November 1952, with a complaint of difficulty in breathing through the left nostril. She stated that she had felt well until early October 1952, when she became aware of a slight nasal obstruction and pinkish color on her handkerchief after blowing her nose. She thought she had a cold and paid little attention to her symptoms.

Approximately five weeks before the onset of the nasal symptoms, she had noticed a small, tender nodule in each buttock, and one in the medial aspect of the left thigh. She had a cholecystectomy scar which was intermittently tender, and it was during a hospitalization for surgical revision of this scar and excision of the nodule in the thigh that she was seen by the otolaryngologist.

Past history and family history revealed that she had had one tubal pregnancy treated surgically. Two other pregnancies terminated in the birth of normal children. In 1946, she had a chronic cough for three months, followed by bronchial pneumonia. She was treated with sulfadiazine and was confined to her bed for 12 days. During the convalescent period she was troubled with pain in the right side of the chest posteriorly. Recovery was complete.

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Examination of the nose on 6 November 1952 revealed an area of ulceration on the left side of the nasal septum and another on the medial surface of the anterior portion of the left inferior turbinate. The cardiolipin test for syphilis was negative. Complete blood cell count and urinalysis were normal.

On 7 November a tender nodule in the cholecystectomy scar and one in the left thigh were excised. Histologic examination showed large central areas of scarring granulation tissue with scattered microabscess-like features. Eosinophils were prominent and there were a few macrophages laden with brown and granular pigment. The diagnosis was granulomatous panniculitis (fig. 1).



Figure 1. Photomicrograph of section of the nodule from the buttock showing granulomatous panniculitis with infiltrate composed of lymphocytes, plasma cells, neutrophils, and eosinophils. The wall of the small arteriole in the center has a smudgy appearance due to fibrinoid degeneration. (Hematoxylin and eosin stain,  $\times 100$ )

On 14 November biopsy specimens were removed from the nasal lesions, which by that time had extended to the right nasal fossa. The tissue was soft, friable, and bled easily, and the nose was very tender and painful. Histologic examination showed acute and chronic inflammation (fig. 2). Cultures from this material showed a moderate growth of hemolytic *Micrococcus pyogenes* var. *aureus* (*Staphylococcus aureus*), *Micrococcus pyogenes* var. *albus* (*Staphylococcus albus*), and *Corynebacterium xerose*.

The patient had been noticing an increasing deafness and pain in the right ear. On 25 November, the right tympanic membrane perforated spontaneously, releasing sanguinopurulent material. The patient was admitted to the hospital the following day. Culture from the aural dis-

charge and from the right nostril showed a heavy growth of hemolytic *M. pyogenes* var. *aureus*, moderately sensitive to streptomycin sulfate and chlortetracycline hydrochloride (aureomycin). Cultures for yeast and fungi were negative. One gram of streptomycin sulfate was given daily from 28 November to 11 December, when, because the patient's condition had not improved, the dose was doubled. Both nasal cavities were almost completely closed and the ulcerated areas were surrounded with friable-appearing mucosa which bled easily. The pain in her ear became almost unbearable, and she was depressed and cried at times.

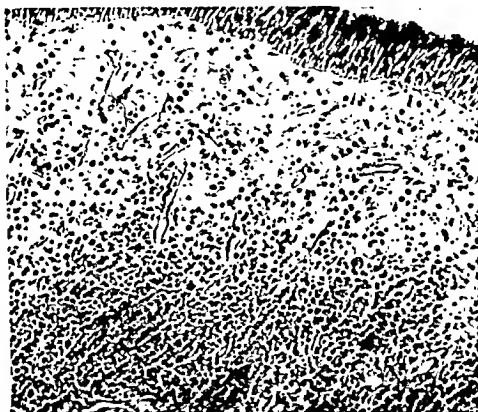


Figure 2. Nasal biopsy. Section showing acute and chronic inflammation with a dense infiltrate of neutrophils, eosinophils, lymphocytes, and plasma cells. (Hematoxylin and eosin stain,  $\times 200$ )

By 19 December she was showing a little improvement, the pain was less severe and she was allowed to return to her home for the holiday season. Streptomycin sulfate was discontinued and 500 mg of chlortetracycline hydrochloride, four times daily, was prescribed.

The patient's condition continued to improve until 19 January 1953, when her hearing again became poor and there was recurrence of pain in her ears and nose. Shortly after this, an area of swelling associated with severe pain developed below the left eye, and she was again admitted to the hospital.

At that time it was noted that she was having a great deal of difficulty in hearing, the masses in the buttocks had increased in size, the nasal lesions were more extensive, acute dacryocystitis had

developed on the left side, and she had lost 23 pounds since the onset of her illness. The swelling under the left eye became fluctuant and on 2 February it was incised and allowed to drain.

The patient was transferred to an Army general hospital, and on 10 February two large masses were removed from the right buttock and one from the left buttock. Histologic examination showed acute and chronic inflammatory infiltrate, including neutrophilic and eosinophilic polymorphonucleocytes, lymphocytes, plasma cells, monocytes, foam cells, and multinucleated foreign-body type giant cells. There were areas of necrotic foci, some of which were seen grossly as soft central areas. The fibrous stroma varied from a very cellular to hyaline structure. There was no evidence of epithelioid tubercle formation. During this hospitalization the white blood cell count had dropped to 3,200 per  $\mu$ l on one occasion and to 4,300 on another, with a normal differential count. Hemoglobin was 9.8 g per 100 ml. Repeated cultures of sections showed hemolytic *M. pyogenes* var. *aureus* sensitive to penicillin and chlortetracycline hydrochloride. The urine remained normal. Her record did not show treatment for anemia or leukopenia, and she was discharged from the hospital on 21 February 1953.

She was readmitted to the hospital on 4 March, complaining of pain in both ears and nose. Examination showed the right tympanic membrane to be perforated and there was bloody discharge. The left tympanic membrane was bulging. There was a small healing lesion in the left lower eyelid. The incision over the lacrimal sac was healed. There was a large perforation through the cartilaginous portion of the nasal septum. Tuning-fork tests indicated a marked conduction deafness. White blood cell count was again normal, red blood cell count was 3,840,000 per  $\mu$ l, and the hemoglobin was 12.7 g per 100 ml. Tuberculosis of the nose was suspected, and the patient was transferred to an Army general hospital where the diagnosis was thought to be eosinophilic granuloma of the nose, paranasal sinuses, left nasolacrimal duct, ears and temporal bones, and subcutaneous tissues of the buttocks and thighs. She was evacuated to the United States, arriving at this hospital 14 April 1953, where she was admitted on the otolaryngology service.

Examination revealed a thin, chronically ill woman, moderately depressed and in obvious discomfort. The patient's entire room was filled with a putrid odor. Her blood pressure was 118/70 mm Hg. Her temperature was normal. She spoke with difficulty because of numerous small tender lesions in the mouth. A deep ulcer, with raised erythematous edges, was noted just below, and medial to, the left eye, which was held closed most of the time (fig. 3). The right tympanic membrane was lusterless. The left tympanic membrane was retracted and there was a foul discharge although a perforation was not seen. Hearing was greatly diminished and tuning-fork tests indicated bilateral conduction deafness. Both nasal passages were greatly diminished in size because of granulomatous, ulcerating masses on all surfaces.

The septal perforation, previously mentioned, was noted. The lesions on the buttocks were still draining, and small tender subcutaneous masses were noted on both shoulders and on the anterior aspect of the right thigh. The liver was palpated three fingersbreadth below the costal margin and was tender. The spleen was palpated two fingersbreadth below the costal margin and was not tender.



*Figure 3. Granulomatous ulceration of the face, apparently originating in the nasolacrimal tract. Autopsy demonstrated a sinus tract leading to an ethmoid cell.*

A tentative diagnosis of lethal midline granuloma was made. This was concurred in by the otorhinolaryngology consultant who advised that the secondary infection be brought under control with adequate antibiotic therapy and that the patient be given a course of cortisone. The medical consultant, while agreeing that the condition could be one of the collagen diseases, strongly advised against cortisone because of the danger of causing a widespread dissemination of the infection. The surgical consultant said he had never seen anything quite like it and suggested that an anaerobic infection might be the cause.

Biopsy specimens revealed a granulomatous inflammation of undetermined cause in a nodule on the right thigh, acute and chronic inflammation of the nasal mucosa, and necrotic tissue in a specimen from the tongue.

Roentgenograms of the sinuses showed marked thickening of the mucous membrane of the right maxillary sinus and complete cloudiness of the left maxillary sinus. There was no evidence of pathologic change in the bones of the skull.

Culture from the nasal mucosa grew nonhemolytic *M. pyogenes* var. *aureus* sensitive to chlortetracycline hydrochloride, Terramycin (brand

of oxytetracycline), Chloromycetin (brand of chloramphenicol), and erythromycin. Smears and cultures for acid-fast bacilli were negative. Guinea pigs inoculated with material aspirated from the left maxillary sinus and obtained by biopsies of the nasal mucosa and a subcutaneous nodule died prematurely of causes other than tuberculosis.

Between 17 and 23 April the patient was given x-ray therapy: 450 r (in air) to an 8- by 11-cm frontal portal and an equal dose to a 10- by 10-cm left lateral portal, with no significant improvement.

Because of the widespread involvement, the patient was transferred to the medical service on 25 April for general care. She continued to be seen daily by a member of the otolaryngology service.

Five hundred milligrams of chloromycetin, four times daily, was prescribed, pending the result of sensitivity studies being made in Dr. Brainard's laboratory at the University of California.

On 29 April it was the consensus at a medical conference that there was some unknown abnormality in the patient's body defense mechanism that could possibly be a lethal midline granuloma, but that the most obvious treatable disease was the widespread micrococcus infection, which was thought to be secondary. Sensitivity tests, run at the University of California, revealed that the organism was highly sensitive to chlortetracycline hydrochloride and relatively insensitive to all other antibiotics tested. Treatment was therefore changed from Chloromycetin to chlortetracycline hydrochloride in the same dosage. A Levine tube was passed into the stomach for the administration of medications and feeding formula.

Repeated blood cultures showed no growth. By 3 May the patient was beginning to show slight improvement; the nodules on the neck and thighs appeared reduced slightly in size but the lesions about the nose and upper lip had extended somewhat. The next day a number of deep red purpura-like spots were noted on the medial aspect of both legs. The subcutaneous lesions, however, failed to improve. By 18 May, the purpuric lesions had begun to fade, liver and spleen were no longer palpable, her mouth began to improve and she was able to sit in a chair for short periods. By 30 May she could breathe some through her nose, and the wounds on her face appeared to be improved. On 11 June, it was noted that her weight had dropped to 7.8 g per 100 ml. She was, therefore, given transfusions of whole blood (500 ml each). She was still given chlortetracycline hydrochloride four times daily.

elevations, and a mild drop in blood pressure (90 to 100 mm Hg systolic and 64 to 72 diastolic).

On 25 June culture from a buttock wound was reported as showing *M. pyogenes* var. *aureus*, sensitive only to Chloromycetin and bacitracin, and pseudomonas resistant to all antibiotics tested. Hemorrhagic lesions developed on the back of the patient's left hand, and small vesicles were noted over the left forearm and anterior chest. The liver and spleen were again palpable. The patient was unable to tolerate Chloromycetin, and was started on 25 mg of cortisone every six hours and 1 gram of potassium chloride three times daily. Her course was rapidly downhill, with increasing hemorrhagic skin lesions, marked perspiration, temperature of 102°F, and generalized nervous twitchings, and she died 30 June.

**Autopsy.** Autopsy performed 10 hours after the patient's death revealed the following pathologic processes which had not been observed previously.\*

1. Necrotizing panarteritis (periarteritis nodosa) involving vessels of the stomach, intestines, liver, kidneys, and bladder. There were a few arteries in the kidneys and one in the liver in which fibrosis suggested healed panarteritis (fig. 4).



Figure 4. Connective tissue of the liver containing partially healed lesion of periarteritis nodosa in a small artery. This artery is practically obliterated by scar tissue while only a few inflammatory cells and a slight amount of fibrinoid material remain. (Hematoxylin and eosin stain,  $\times 100$ )

\*Gross and microscopic examination was performed by Captain Joseph H. Masters, and the slides were reviewed by Dr. Alvin J. Cox, Major T. R. Anderson, and one of us (M. W. B.).

2. Inflammatory angitis of the lungs, kidneys, adrenals, and skin.
3. Mucosal ulceration of the stomach and intestines.
4. Necrotizing granulomatosis of the lungs and kidneys.
5. Necrotizing bronchitis.
6. A sinus tract leading from the infraorbital ulceration to an ethmoid cell.
7. Blood culture (heart) revealed hemolytic *M. pyogenes* var. *aureus*, coagulase-positive.

### COMMENT

It is interesting to note that there was some evidence of healed panarteritis in the kidneys and liver. Although the main picture was one of extensive inflammation and necrosis, there were a few fibrosed arteries, lacking in inflammatory cells, suggesting focal areas of healing or healed panarteritis. While periarteritis nodosa has been considered to be a terminal development in cases of idiopathic granuloma,<sup>11</sup> this observation indicates that some of the vascular lesions had developed in an earlier stage of the disease.

### SUMMARY

A case of lethal midline granuloma associated with periarteritis nodosa is presented. While periarteritis nodosa tends to be a terminal development in cases of idiopathic granuloma, the finding of a few focal areas of healed panarteritis in this case is evidence that these healed lesions, at least, developed during an earlier stage of the disease.

The two conditions (lethal midline granuloma and periarteritis nodosa) appear to be the result of hyperimmunity, causing the granulomatous lesions when capillaries are involved and periarteritis nodosa when somewhat larger vessels are involved.

Cortisone or corticotropin, in order to be of any benefit in the treatment of lethal granuloma or periarteritis nodosa, should be given early in the course of the disease, in adequate dosage and with careful supervision.

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### EVALUATION OF DISCOID LUPUS

"The classification of lupus erythematosus is an arbitrary one. There are many transitions between the types. Discoid lupus, from its inception, is a systemic disorder which is a variant of the more malignant acute disseminated form. The "benign"-appearing cutaneous lesion may be a herald of advanced systemic manifestations which may be present at the same time or at a later date, when the skin changes have healed. Therefore, all these patients should have a thorough general medical survey. The form of therapy instituted depends entirely upon the extent of the disease."

—E. L. DUBOIS, M. D., and  
STUART MARTEL, M. D.  
in *The Journal of the American Medical Association*, p. 811, June 30, 1956



## Placenta Accreta

JOHN R. O'BRIEN, M. D.

CHARLES C. SORENSON, Major, USAF (MC)

GORDON E. SCOTT, Captain, USAF (MC)

FREDERICK SILVERMAN, Captain, USAF (MC)

**P**LACENTA ACCRETA is "an abnormal adherence of part of the placenta or all of it to the uterine wall with partial or complete absence of the decidua basalis, especially the spongiosum layer."<sup>1</sup> Based on the depth of invasion of trophoblastic elements, Kallreider<sup>2</sup> classified the condition as: (1) placenta accreta (pathologic adherence only), (2) placenta increta (penetration of uterine wall), and (3) placenta percreta (uterine wall penetrated to or through serosal layer, and in some cases ruptured). A second classification describes the surface extent of the abnormal placental attachment: focal, partial, or complete.<sup>3</sup>

The main causal factor appears to be injury to the endometrium by trauma, infection, an associated obstetric or gynecologic disorder, or an endocrine imbalance. Traumatic causes include previous manual removal of an adherent placenta leaving scars, dilatation and curettage, therapeutic abortion, radium therapy, and cesarean section. Infections include tuberculous peritonitis and endometritis. Fibroids, diverticula, placenta praevia, cornual implantation, placenta membranacea, and adenomyosis have been listed as associated obstetric or gynecologic disorders. A defective corpus luteum might contribute to an endocrine imbalance leading to placenta accreta.<sup>1,4-6</sup>

Various estimates as to incidence range from 1:1956 (Irving and Hertig<sup>7</sup>) to 1:25,000 (Chern and Rosenberg<sup>8</sup>). Greenhill<sup>4</sup> believed it to be 1:2,000; Chisholm,<sup>9</sup> from 1:200 to 1:20,000; and Phaneuf<sup>10</sup> found an occurrence of 1:14,622 in his survey. Eastman<sup>5</sup> did not observe a single case of complete accreta in over 70,000 deliveries. Only a few more than 200 cases were recorded up to 1953.<sup>1</sup> Israel, Siegel, and Rubinstein<sup>11</sup> stated that a total of 31 cases of simultaneous placenta praevia and increta had been recorded in the literature up to 1955.

Clinically, there is only a failure to expel the placenta normally. Normal separation from areas totally lacking in decidua is impossible. With complete accreta no bleeding is present because all of the placenta is adherent. Some retained placentas

may be focal placenta accrete, with multiple fibrous attachments to the uterus. Partial accreta is often accompanied by the severe bleeding associated with partial separation. In rare instances, hemorrhagic shock may be associated with spontaneous rupture of the uterus and/or trophoblastic erosion of large uterine artery branches, leading to massive intra-abdominal hemorrhage. Other factors which may cause hemorrhage are placenta praevia, traumatic attempts at manual removal leading to rupture of the uterus, rupture by a curet, or inversion of the uterus.<sup>11,12</sup> Diagnosis is made by failure to find a clotsagolino in attempting atraumatic manual removal of the placenta.

The treatment of choice for almost all patients is listed in standard texts as immediate abdominal hysterectomy once the diagnosis is made.<sup>11,12</sup> Muir<sup>13</sup> reported a case in which the placenta of a four and one-half month abortus could not be removed manually. There being virtually no bleeding, the patient was put to bed and given antibiotics. By eight weeks, uterine drainage had ceased. Two months later the patient became pregnant, going on to a normal delivery and third stage. Greenhill<sup>14</sup> cited 14 cases in which the placenta was allowed to remain intact without an attempt at removal. All 14 women survived. Others<sup>15-16</sup> urge conservative treatment when possible. It is recommended that the therapy chosen should depend on the amount of bleeding and the uterine response to complete or partial removal of the placenta. In complete accreta with little bleeding, the placenta should be drained of fetal blood and allowed to become organized and absorbed. With partial accreta too densely adherent to be removed, the uterus should be packed and treated expectantly. Unfortunately, even with adequate blood replacement this rarely suffices, and hysterectomy becomes the treatment of necessity. Israel, Siegel, and Rubenstein recommended that with combined placenta praevia-placenta accreta discovered at cesarean section, hysterectomy be done. The following case report describes an attempt at conservative therapy for partial accreta which failed, and for which hysterectomy was necessary.

#### CASE REPORT

A 26-year-old woman, gravida 2, para 1, whose estimated date of confinement was 30 June 1955, was admitted to the maternity ward of this hospital at 2100 on 10 July with a history of cramping pain in the lower abdomen of several hours' duration. The pain ceased soon after admission. The patient was discharged the following morning, to be seen shortly in the prenatal clinic. She was readmitted on 14 July at 2300, with the bag of waters having ruptured earlier at home.

The prenatal course was marked by a moderate degree of polyhydramnios and a marked diastasis recti abdominis. Blood pressure determinations and repeated urinalyses were always within normal limits.

Hematocrit on 7 July (one week prior to delivery) was 38 ml per 100 ml, with a hemoglobin of 12 g per 100 ml. A roentgenogram of the abdomen taken on 7 July revealed a single fetus, near term, in cephalic presentation, with an unusually large amount of fluid present.

The previous obstetric history was that of one previous pregnancy in 1954, highlighted by mild post-partum atony of the uterus, and death of the 7 lb 7½ oz newborn infant 32 hours after birth due to massive intracranial hemorrhage, secondary to a right tentorial laceration.

Uterine contractions began at 0200 on 15 July. The first stage of labor ended at 0600. A saddle block anesthesia, using 3 mg of Pontocaine (brand of tetracaine hydrochloride) was performed at 0610. However, it was concluded shortly thereafter that the patient was not ready for delivery. She was returned to the first-stage room to be kept under close observation. Fetal heart tones remained good, as did maternal pulse and blood pressure.

At about 0945, a posteroanterior and left lateral roentgenogram of the abdomen and pelvis were taken showing the fetus in tight occiput transverse position at +2 station.

At 1015, 4 hours and 15 minutes of the second stage having elapsed since the saddle block anesthesia, the patient was returned to the delivery room. Blood was drawn for typing and cross-matching. An infusion of 5 per cent dextrose in water was started. Penicillin and streptomycin sulfate were administered intramuscularly. The blood pressure at 1015 was 94/50 mm Hg. The patient was prepared, draped, and catheterized, and anesthetized with a pudendal block using 1 per cent Xylocaine (brand of lidocaine hydrochloride). At 1035, 75 mg of Demerol (brand of meperidine hydrochloride) were given intramuscularly, putting the patient to sleep.

Manual rotation of the head was unsuccessful, as was the use of Simpson's forceps via the wandering technic. The patient was delivered with Kielland's forceps, using the inversion method of application, of an 8 lb 10 oz male infant. The baby was in fair condition. Normal respiration was established in approximately 40 seconds.

The mother was given a 1 ml-ampule of Pitocin (brand of oxytocin) intramuscularly after delivery, at 1127. A transfusion of blood (500 ml) was started at 1134. Blood pressure at this time was 109/70 mm Hg and the pulse 84. One hour of the third stage elapsed without spontaneous delivery of the placenta, prior to an attempt at manual removal. A portion of the placenta was removed piecemeal. It was impossible to find a line of cleavage for all of the placenta. One milliliter of Ergotrate (brand of ergonovine maleate) was given intravenously. A 6-cm cervical laceration of the anterior lip was repaired. At 1245 blood pressure was 90/60 mm Hg and the pulse 92. By 1410, 1,000 ml of whole blood and 500 ml of dextran had been administered. Excessive bleeding, after repair of the cervical laceration, was encountered and

felt to be due in large measure to uterine atony. The uterus was thoroughly packed in what proved to be an unsuccessful effort to treat the atony.

At 1500, the patient was taken to the operating room. The packing was removed, the uterus re-explored, and the diagnosis of placenta accreta was confirmed. In view of the marked uterine atony, with consequent extensive bleeding, a rapid total hysterectomy was performed under general anesthesia. Blood was replaced in adequate quantities. The patient left the operating room with a pulse of 84, and a blood pressure of 110/84 mm Hg.

On opening the specimen, an 8- by 8-cm portion of placenta was noted to be tightly adherent to the anterior wall of the uterus. A 2-cm laceration was present at the left lateral aspect of the lower uterine segment. The cervical laceration had been entirely repaired.

Postoperatively, the blood pressure and pulse were maintained within normal limits. Therapy included adequate fluid and electrolyte replacement, massive doses of antibiotics, and multiple blood transfusions. The patient received a total of 3,500 ml of whole blood during her hospital stay. Spiking temperatures were present until the fifth postoperative day. The patient was discharged on the tenth postoperative day in good condition.

The pathology report by William A. Meriwether, Captain, MC, USA (6th Army Area Medical Laboratory, Fort Baker, Calif.) and confirmed by the Armed Forces Institute of Pathology noted grossly an area of undetachable placenta adherent to the uterine wall. Microscopically, "cotyledons were lying adjacent to the uterine musculature, separated only by an occasional decidual cell" (figs. 1-3).

Final diagnosis: Placenta accreta, partial.

#### COMMENTS

As previously noted, conservative therapy for partial placenta accreta is rarely successful. The occasional success, however, warrants a trial in young women of low parity, provided the patient is closely observed and adequate blood replacement is at hand.

In the case reported, the uterine atony encountered was apparently due to a combination of factors, namely, overdistention of the uterus, a greatly prolonged second stage, too vigorous attempts at manual removal of the placenta, and possibly, the rent in the lower uterine segment. A previous obstetric history of traumatic delivery and post-partum atony indicated the need for cautious management of the second and third stages of labor.



Figure 1. Low power view of cotyledons lying adjacent to uterine musculature. ( $\times 100$ )



Figure 2. Medium power view of villi adjacent to uterine musculature. ( $\times 430$ )



Figure 3. High power view of villi adjacent to uterine musculature separated only by an occasional decidual cell.

### SUMMARY

A reported case of partial placenta accreta illustrates the fact that this condition usually warrants hysterectomy, total hysterectomy being the treatment of choice.

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### THE CASE FOR HYSTERECTOMY

When the health of a woman, physically and emotionally, is compromised by an abnormal uterus to a serious degree (and the judgment of this degree of disability is squarely on the shoulders of the conscientious surgeon performing hysterectomy), excision has proved one of the most satisfactory procedures in all surgery. The emotional confusion in consideration of the sexual organs, femininity, and procreation has prevented some from seeing or realizing the great importance of extending hysterectomy to those in dire need of it. Hysterectomy should never be performed for minor complaints and minor findings, but only when there are major diseases or when those complaints and findings add up to a major disability.

—LAMAN A. GRAY, M. D.  
in *A. M. A. Archives of Surgery*  
p. 500, Oct. 1954

# Spinal Cord Pseudotumor

## A Complication of Pantopaque Myelography

SARKIS S. SARKISIAN, *Commander, MC, USN*

**W**HEN radiopaque substances are injected into the spinal canal in myelography, an occasional local tissue reaction should be expected. Such a reaction was seen in a patient who had been evaluated for spinal cord tumor.

### CASE REPORT

A 39-year-old woman had first noted urinary stress incontinence following an episode of viral pneumonia. This symptom gradually became worse, and on 4 January 1956 a myelogram was done, using Pantopaque (brand of iophendylate). This was repeated on 2 February. No tumor was revealed by either of these examinations.

On 29 February the patient noted the onset of numbness over the sole of the left foot, in the perineum, and along the back of the left leg. The physical examination and past history supplied no other pertinent information. The neurologic examination showed slight hypalgesia of S3, S4, and S5 segments. The impression was: cauda equina lesion with cord compression. A third myelogram on 15 March was interpreted as showing a tumor at the L5-S1 level. The filling defect measured 1 by 3/4 cm and was constant, suggesting a spinal cord tumor in this area (fig. 1).

On 21 March a laminectomy of L5, S1, and S2 was performed. This revealed an inflammatory subdural tumor mass, as much as possible of which was removed. There was an uneventful recovery, and one month postoperatively the patient was much improved. The tumor (fig. 2) was a lipoid granuloma composed of fibroblastic cell proliferation, foreign-body-type giant cells, and "punched-out" areas representing lipoid material.

### DISCUSSION

Before Pantopaque was first used in clinical trials, Steinbausen and associates<sup>1</sup> studied its effects on dogs. They reported foreign body response when the oil was injected intrathecally, with encystment within about six weeks. When used in humans, Pantopaque has given excellent results generally. Marcovich, Walker, and Jessico<sup>2</sup> reviewed 150 cases in which iodized oil had been



used to examine the spinal cord and found no deaths referable to the injection. Bering<sup>1</sup> reported on a series of 106 cases in which he used Pantopaque with no untoward results, except for a single case where the Pantopaque became fixed in one mass. Arbunkle, Sheldon, and Pudenz<sup>2</sup> and Peacher and Robertson<sup>3</sup> reported over 400 additional cases with no unusual findings.



*Figure 1. Roentgenograms revealing constant filling defect at L5 and S1 level.*

On the other hand, Camp<sup>4</sup> reported encystment of Pantopaque subsequent to myelography. Luce, Leith, and Burrage<sup>5</sup> described two cases of delayed noninfectious meningitis with spinal fluid findings of increased protein and inflammatory cells. Erickson and van Baaren<sup>6</sup> reported a case presenting manifestations of late meningeal reaction with fatal termination, in which autopsy revealed a fibrinous exudate over the base of the brain and thoracic spinal cord, with microscopic evidence of widespread dispersion of oil.

Fine emulsification of the oil may introduce an additional hazard that must be considered during myelography. In fact, Jagger<sup>7</sup> showed that in dogs intrathecal injection of emulsified Pantopaque caused death in 10 minutes. It would seem that a bloody tap should be considered a contraindication for the injection of oil intrathecally, for blood can cause emulsification of the oil.



Figure 2. Photomicrograph of section of spinal cord lesion revealing typical lipoid granuloma. ( $\times 200$ ) (Medical Illustration Section, First Army Area Medical Laboratory)

### CONCLUSIONS

It is necessary to take precautions during any myelographic procedure when a foreign material is injected intrathecally. Injection of oil should be postponed in case of a bloody spinal tap. The iodized oil should not be emulsified with spinal fluid or other material. An attempt to remove as much of the iodized material as possible should be accomplished after completion of myelography. It should be remembered that injection of such materials can elicit local tissue proliferation as well as a systemic sensitivity response.

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#### TEACHERS OF MEDICINE

"One of the diseases of our society is this erroneous belief that the brave new world will come to pass by miracles of structural design and intricate organization alone. Plans there must be, but personalities must take precedence of plans. The basic essential is to ensure that medical students, both undergraduates and post-graduates, are associated with (not just taught by) those whose lives and work are examples of excellence in scholarship and professional skill. These teachers must be ever dissatisfied with their efforts, critical of themselves and others, forever scheming and striving to test the truth of what appears to be known, and planning to enlarge knowledge. Among such there is no room for the complacent, the arrogant, the staunch upholder of tradition, and the stout defender of the status quo. The quality of our teachers is all-important and a heavy responsibility rests on those who have to select the academic staffs and consultants responsible for medical education."

—W. MELVILLE ARNOTT, M. D.  
in *Lancet*, p. 785, Oct. 15, 1955

## A MESSAGE FROM THE A. M. A.

No project initiated by the American Medical Association in the past 10 years has received wider applause and support than its program of assistance to medical schools in financing their operations. The American Medical Education Foundation was established in 1950 to stimulate voluntary contributions from physicians for use in support of the nation's approved medical schools.

Following World War II, the medical schools faced an expanded enrollment and mounting operating costs. Their teaching programs had to keep pace with the rapid advance of medical science and the broadening concept of medicine's role in the community. The traditional sources of income were insufficient to meet the postwar rising costs and at the same time maintain the high standard of medical education in the United States. It was estimated that at least an additional \$10,000,000 each year was necessary to make up the deficits of the medical schools.

To meet this need, the A. M. A. sponsored the American Medical Education Foundation, which was incorporated to receive donations from individual physicians to help defray the costs of our present-day medical education system and to administer the allocation of these funds. The A. M. A. gave \$500,000, the first donation to the Foundation, and agreed to finance the costs of promotion and administration. As a result, the Foundation is one of the few organizations now raising funds in the United States whose *entire income in contributions goes to the cause for which funds are donated.*

During the past six years, the Foundation has received and distributed \$4,684,312 to medical schools. In 1955, more than 25,000 contributors made individual gifts to the Foundation. The A. M. A. has made grants totaling \$1,100,000, which the Foundation has distributed for the private support of medical schools. It has continued to pay all administrative costs, and exerts every effort to encourage and further the program.

Several policies were established by the Foundation with respect to contributions, one of them being a rule that no donations would be restricted as to use in the medical schools. This policy was necessary since many restricted grants made in prior

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From the Council on National Defense of the American Medical Association. The views and opinions expressed are not necessarily those of the Department of Defense.  
—Editor

years could not properly be integrated into a medical school's program because of the limited administrative and housekeeping facilities of the school. Many deans have expressed their gratitude for this rule that permits freedom of utilization and thereby makes the actual grant worth many times its face value.

Another policy adopted early was the acceptance from physicians of donations specifically earmarked for the school of their choice. This was done so that full expression could be made of the physician's loyalty to his alma mater. The rule also permits the Foundation to co-ordinate its efforts with an active annual alumni giving program. Since 1953 the Foundation has served the medical schools as a clearing house for statistical information in regard to alumni giving. It has reported each year the amount of money given without restrictions directly to each of the medical schools by their alumni.

The success of the American Medical Education Foundation has largely been a result of the work done by physicians in the constituent and component societies of the A. M. A. Across the nation, state associations have appointed chairmen and committees who have made it their job to tell their colleagues about the importance of support for the medical schools. In the American way, each state has adopted a different attack to this problem. A number of state medical societies increased the dues of individual physicians and allocated the increase to the Foundation. Other state societies have a voluntary entry for the Foundation on their dues statement, and many of the societies give large donations from their state treasuries.

These generous contributions from the societies themselves are matched in many states by purely voluntary appeals made in an organized way at the local level. The importance of the program, however, does not reach everyone's ears at once; so it has been a steady effort in education to acquaint every member of the profession with the existence of the Foundation and its purposes. It is expected that within a short time, the \$2,000,000-year goal from the physicians of the nation will be reached.

One of the questions constantly asked is how this money is used. Unsought replies to this question pour in from the medical schools. Deans constantly write in gratitude to the Foundation, describing the importance of this source of income. One medical school dean was able to raise the salaries of his instructors enough to show them that the school was appreciative of their services and thus hold his faculty, whereas he had been in danger of losing them because he had no other source of income for these raises. Another dean reported that it would have been impossible for him to increase the seating capacity of several classrooms if it had not been for grants received from this source.

As the costs of everything spiral these days, and a greater toaching burden is placed upon the medical schools by the expansion of medical knowledge, the support of the 82 medical schools of this country ns they have always been supported, by the generosity of privato philanthropy, must be continued. The nation's physieians must lead the way.

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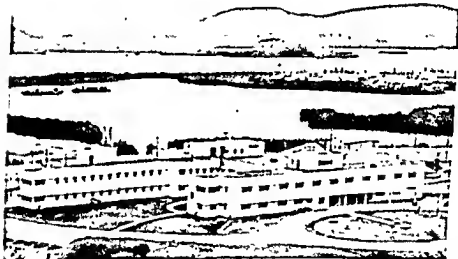
## DEATHS

HALE, Legan Owsley, Major, DC, AUS, nf Big Clifty, Ky.; statinned at Fort Jackson, S. C.; graduated in 1946 from University of Louisville Schnal nf Dentistry, Louisville, Ky.; appnointed First Lieutenant 10 May 1949 and called tn active dútý 25 May 1949; died 29 June 1956, age 37, at U. S. Army Hospital, Fort Jackson, S. C., nf bilateral pneumonia with complications.

McCULLEY, Grace Elizabeth, Lieutenant Colonel, ANC, USAR, of Trenton, N. J.; stationed at U. S. Army Hospital, Fort Carson, Cnln.; graduated in 1929 from Newark City Hospital School of Nursing, Newark, N. J.; appointed Second Lieutenant, ANC, 8 July 1942; died 2 July 1956, age 50, at U. S. Army Hospital, Fort Huachuca, Ariz., of hypertensive cardiovascular disease.

## NEW NAVAL HOSPITAL IN CUBA

The new 100-bed U. S. Naval Hospital at Guantanamo Bay, Cuba, was dedicated on 28 September 1956. The hospital cost \$2,500,000 exclusive of equipment, and is the first naval hospital to be completely air conditioned. It will replace the temporary building used for many years as the base hospital.



Among the distinguished guests present was Dr. F. B. Berry, Assistant Secretary of Defense (Health and Medical). During the ceremony Rear Admiral B. W. Hogan, Surgeon General, U. S. Navy, accepted the new structure with its latest medical facilities and then turned it over to Captain L. A. Newton, MC, USN, Commanding Officer. In dedicating the hospital the Surgeon General paid tribute to the men and women of the Medical Department of the Navy, saying:

"Here, again, we find—and I am most happy to remark on it—that this grand record in hospitalization in Cuba is due very largely to the magnificent examples of those medical men and women of the Navy who have here preceded us—their examples of love for the Navy, of zeal to advance themselves constantly in knowledge and proficiency, and of devotion to their duties—their example, which is possibly the most to their credit, of kindly consideration and encouragement for their patients.

"It is an anatomical fact, that the heart is halfway between the head and the hand. At the bedside of a sick or wounded bluejacket, the brainy mind of the doctor is very important; as, likewise, the deft and sensitive hand that holds the scalpel is a blessing to the patient, of



*Dedicatory address is presented by Rear Admiral Bartholomew W. Hogan, MC, USN, Surgeon General, U. S. Navy. Seated, left to right, are Captain Willard C. Calkins, MSC, USN, Director, Medical Service Corps Division, Bureau of Medicine and Surgery, Department of the Navy; Captain Leslie D. Ekvall, MC, USN, District Medical Officer, 10th Naval District; Captain Lyle A. Newton, MC, USN, Commanding Officer, U. S. Naval Hospital, Guantanamo Bay, Cuba; Doctor Frank B. Berry, Assistant Secretary of Defense (Health and Medical); and Rear Admiral William G. Cooper, USN, Commander, U. S. Naval Base, Guantanamo Bay, Cuba.*

vital and paramount value. Above these boons, however, is the supreme Godsend of a kindly heart, the balsam of a cordial smile, the reanimating transfusion the physician gives by his sincere and personal interest in his each and every patient. By passing from hand to hand such a torch of medical excellence, even better in the future than in the past, our Naval Medical Department will one day see fully realized, if not all, at least the majority of the zealous and onward aspirations that now signalize it. . . . I hereby dedicate this hospital to the physical, mental, and spiritual welfare of all military personnel and their dependents. It is furthermore dedicated to all mankind in times of possible disaster."



## THE NATIONAL LIBRARY OF MEDICINE

The Armed Forces Medical Library was transferred to the Public Health Service of the U. S. Department of Health, Education, and Welfare on 1 October 1957. The National Library of Medicine Act, signed by President Eisenhower on 3 August 1956, established a National Library of Medicine in the Public Health Service "to assist the advancement of medical and related sciences and to aid the dissemination and exchange of scientific and other information important to the progress of medicine and to public health." The Armed Forces Medical Library forms the nucleus of the National Library.

The Armed Forces Medical Library was founded in 1836 as the Library of the Surgeon General's Office, U. S. Army. It was one of the largest and most important medical libraries in the world. It contained almost a million volumes, representing literature on medicine, dentistry, pharmacy, and allied sciences in all languages and of all times. Its books were loaned to other libraries throughout the United States.

In administering the National Library of Medicine, the Surgeon General of the Public Health Service will be assisted by a Board of Regents consisting of 10 persons to be appointed by the President and confirmed by the Senate. Ex officio members of the Board are the Surgeons General of the Public Health Service, the Army, Navy, and Air Force; the Chief Medical Director of the Department of Medicine and Surgery of the Veterans' Administration; the Assistant Director for Biological and Medical Sciences of the National Science Foundation; and the Librarian of Congress. Colonel Frank B. Rogers, who was the Director of the Armed Forces Medical Library, is the Director of the National Library of Medicine.

The National Library of Medicine Act also authorizes the construction of adequate facilities to house the Library on a site to be selected by the Surgeon General of the Public Health Service at the direction of the Board of Regents.

# Promotions of Officers

The following officers of the military medical services on active duty in the Navy have received temporary promotions to the rank indicated.

## MEDICAL CORPS

ALBERT, Harold M., Comdr., USN  
 ALLEBACH, Newton W., Comdr., USN  
 ALMODOVARACEVEDO, R. A., Comdr., USN  
 ALVAREZ, Jose A., Comdr., USN  
 AMBROSE, Paul, Comdr., USN  
 ANTHONY, Lynn E., Comdr., USN  
 ARENTZEN, Willard P., Comdr., USN  
 BAISCH, Bruce F., Comdr., USN  
 BAKER, Howard A., Comdr., USN  
 BAKER, Jack W., Comdr., USN  
 BARASCH, Aaron H., Comdr., USN  
 BARIA, William H., Comdr., USN  
 BARONOFFSKY, Ivan D., Comdr., USN  
 BARRON, Sholom S., Comdr., USN  
 BATES, Richard C., Comdr., USN  
 BAXLEY, Benjamin H., Comdr., USN  
 BAXTER, Jack W., Comdr., USN  
 BECKER, Frederick B., Comdr., USN  
 BECKWITH, Carl C., Comdr., USN  
 BENFIELD, William H., Comdr., USN  
 BELOTT, Louis V., Comdr., USN  
 BENSON, Victor G., Comdr., USN  
 BERARD, William P., Comdr., USN  
 BERLINER, Benjamin C., Comdr., USN  
 BIGFORD, Walter D., Comdr., USN  
 BISHARAT, Maurice H., Comdr., USN  
 BLAHA, Vernon B., Comdr., USN  
 BOKHAIR, Labeeb N., Comdr., USN  
 BOOTH, George R., Jr., Comdr., USN  
 BOURNE, George C., Comdr., USN  
 BOWMAN, Murdock S., Comdr., USN  
 BRADY, Joseph A., Comdr., USN  
 BRANCA, Alfred W., Comdr., USN  
 BRENNAN, Thomas J., Comdr., USN  
 BRIMSON, James A., Capt., USN  
 BROWN, Carleton J., Comdr., USN  
 BROWN, Henry, Comdr., USN  
 BROWN, Loy T., Comdr., USN  
 BROWN, Roy G., Comdr., USN  
 BROWNELL, William M., Comdr., USN  
 BRUNDAGE, Robert D., Comdr., USN  
 BRYAN, Allen L., Comdr., USN  
 BURDETTE, Harold F., Comdr., USN  
 BURDICK, Robert L., Comdr., USN  
 BURNHAM, Charles J., Comdr., USN  
 BUTSCHER, William C., Jr., Comdr., USN  
 CALLISTER, Thomas J., Comdr., USN  
 CARMICHAEL, David B., Jr., Comdr., USN  
 CASSARA, Sam, Comdr., USN  
 CHARIF, Benson S., Comdr., USN  
 CHASE, John F., Capt., USN  
 COFFEY, John D., Jr., Comdr., USN  
 COFFMAN, Graham M., Comdr., USN  
 CONNOR, Richard B., Comdr., USN  
 COUNTRY, John C., Comdr., USN  
 CUMMINS, John P. J., Jr., Comdr., USN  
 CUNNINGHAM, Robert E., Jr., Comdr., USN  
 CURTIN, Leo V., Comdr., USN  
 CUTLER, Garnet C., Comdr., USN  
 DARMSTAETTER, A. A., Jr., Comdr., USN  
 DAUGHERTY, Philip V., Comdr., USN  
 DAVIS, Harold A., Comdr., USN  
 DAVIS, Jasper W., Comdr., USN  
 DAVIS, John R., Jr., Comdr., USN  
 DAVIS, Tudor B. C., Comdr., USN  
 DAVIS, William D., Jr., Comdr., USN  
 DEAN, George W., Comdr., USN  
 DEAS, Thomas C., Comdr., USN  
 DEMAILLY, Robert G., Comdr., USN  
 DIKLICH, Milan, Jr., Comdr., USN  
 DIMMETTE, Robert M., Comdr., USN  
 DINEEN, James R., Comdr., USN  
 DIXON, David C., Comdr., USN  
 DOBBINS, Richard F., Comdr., USN  
 DREWES, Everett L., Comdr., USN  
 DROEGE, Fred D., Comdr., USN  
 DUNN, Adolphus W., Comdr., USN  
 EBY, Edwin G., Comdr., USN  
 ECHOLS, Raymond S., Comdr., USN  
 ELKIND, Maurice P., Comdr., USN  
 ELLE, John V., Comdr., USN  
 ELSON, Ralph, Comdr., USN  
 ERRION, Arthur R., Capt., USN  
 ESSWEIN, John G., Comdr., USN  
 EVANS, Willis F., Comdr., USN  
 FEATHERSTON, John S., Comdr., USN  
 FEROVED, James W., Capt., USN  
 FITZGIBBONS, Robert J., Comdr., USN  
 FLACK, Hugh A., Comdr., USN  
 FLIESCHAKER, Robert J., Comdr., USN  
 FLIPGE, Martin E., Jr., Comdr., USN  
 FOLCK, William P., Comdr., USN  
 FOULK, Richard, Comdr., USN  
 FOWLER, Nathaniel E., Comdr., USN  
 FRANKEL, Donald B., Comdr., USN  
 FRANKHAUSER, Robert K., Comdr., USN  
 FRASER, Alan W., Comdr., USN  
 FRASER, William E., Comdr., USN  
 FULLER, Frank D., Comdr., USN  
 FULTZ, Robert E., Comdr., USN  
 FUTERNICK, Benjamin, Comdr., USN  
 GAUDER, Peter J., Comdr., USN  
 GAY, Leonard A., Comdr., USN  
 GEIB, Phillip G., Comdr., USN  
 GELBIN, Ruchl M., Comdr., USN  
 GERBASI, Francis S., Comdr., USN  
 GERLING, John J., Comdr., USN  
 GILLEM, Norbert P., Comdr., USN  
 GILLESPIE, David G., Comdr., USN  
 GOLDBLUM, Abraham D., Comdr., USN  
 GRANT, Benjamin F., Comdr., USN  
 GREANEY, Martin O., Jr., Comdr., USN  
 GREENBERGER, Sidney, Comdr., USN  
 GREER, James W., Comdr., USN  
 GREENER, David J., Comdr., USN  
 GRENNING, Roy R., Comdr., USN  
 GRIFFIN, William D., Comdr., USN  
 GRINNEY, Leo R., Comdr., USN  
 GROGS, Isadore, Comdr., USN  
 HAGUE, James D., Capt., USN  
 HALL, William A., Comdr., USN  
 HAGLER, Carl W., Comdr., USN  
 HAMILTON, James R., Comdr., USN  
 HANSEN, Walter F., Comdr., USN  
 HARDY, William P., Comdr., USN  
 HARRIS, James H., Comdr., USN  
 HART, Dale E., Comdr., USN  
 HARTLEY, George T., Capt., USN  
 HASEGAWA, Junji, Comdr., USN  
 HELGERSON, Arthur A., Comdr., USN  
 HENDRICKS, Frank R., Comdr., USN  
 HERMAN, Julius W., Comdr., USN

## THE NATIONAL LIBRARY OF MEDICINE

The Armed Forces Medical Library was transferred to the Public Health Service of the U. S. Department of Health, Education, and Welfare on 1 October 1956. The National Library of Medicine Act, signed by President Eisenhower on 3 August 1956, established a National Library of Medicine in the Public Health Service "to assist the advancement of medical and related sciences and to aid the dissemination and exchange of scientific and other information important to the progress of medicine and to public health." The Armed Forces Medical Library forms the nucleus of the National Library.

The Armed Forces Medical Library was founded in 1836 as the Library of the Surgeon General's Office, U. S. Army. It was one of the largest and most important medical libraries in the world. It contained almost a million volumes, representing literature on medicine, dentistry, pharmacy, and allied sciences in all languages and of all times. Its books were loaned to other libraries throughout the United States.

In administering the National Library of Medicine, the Surgeon General of the Public Health Service will be assisted by a Board of Regents consisting of 10 persons to be appointed by the President and confirmed by the Senate. Ex officio members of the Board are the Surgeons General of the Public Health Service, the Army, Navy, and Air Force; the Chief Medical Director of the Department of Medicine and Surgery of the Veterans' Administration; the Assistant Director for Biological and Medical Sciences of the National Science Foundation; and the Librarian of Congress. Colonel Frank H. Rogers, who was the Director of the Armed Forces Medical Library, is the Director of the National Library of Medicine.

The National Library of Medicine Act also authorizes the construction of adequate facilities to house the Library on a site to be selected by the Surgeon General of the Public Health Service at the direction of the Board of Regents.

# Promotions of Officers

The following officers of the military medical services on active duty  
in the Navy have received temporary promotions to the rank indicated.

## MEDICAL CORPS

ALBERT, Harold M., Comdr., USN  
ALLEBACH, Newton W., Comdr., USN  
ALMODOVARACEVEDO, R. A., Comdr., USN  
ALVAREZ, Jose A., Comdr., USN  
AMBROGE, Paul, Comdr., USN  
ANTHONY, Lynn E., Comdr., USN  
ARENTZEN, Willard P., Comdr., USN  
BAISCH, Bruce F., Comdr., USN  
BAKER, Howard A., Comdr., USN  
BAKER, Jack W., Comdr., USN  
BARASCH, Aaron H., Comdr., USN  
BARIA, William H., Comdr., USN  
BARCROFTSKY, Ivan D., Comdr., USN  
BARRON, Shalom S., Comdr., USN  
BATES, Richard C., Comdr., USN  
BAXLEY, Benjamin H., Comdr., USN  
BAXTER, Jack W., Comdr., USN  
BECKER, Frederick B., Comdr., USN  
BECKWITH, Carl C., Comdr., USN  
BEINFELD, William H., Comdr., USN  
BELOTT, Louis V., Comdr., USN  
BENSON, Victor G., Comdr., USN  
BERARD, William P., Comdr., USN  
BERLINER, Benjamin C., Comdr., USN  
BIGFORD, Walter D., Comdr., USN  
BISHARAT, Maurice H., Comdr., USN  
BLAHA, Vernon B., Comdr., USN  
BCKHAIR, Labeeb N., Comdr., USN  
BOOTH, George R., Jr., Comdr., USN  
BOURNE, George C., Comdr., USN  
BOWMAN, Murdock S., Comdr., USN  
BRADY, Joseph A., Comdr., USN  
BRANCA, Alfred W., Comdr., USN  
BRENNAN, Thomas J., Comdr., USN  
BRIMSON, James A., Capt., USN  
BROWN, Carleton J., Comdr., USN  
BROWN, Henry, Comdr., USN  
BROWN, Loy T., Comdr., USN  
BROWN, Roy G., Comdr., USN  
BROWNELL, William M., Comdr., USN  
BRUNDAGE, Robert D., Comdr., USN  
BRYAN, Allen L., Comdr., USN  
BURDETTE, Harold F., Comdr., USN  
BURDICK, Robert L., Comdr., USN  
BURNHAM, Charles J., Comdr., USN  
BUTSCHER, William C., Jr., Comdr., USN  
CALLISTER, Thomas J., Comdr., USN  
CARMICHAEL, David B., Jr., Comdr., USN  
CASSARA, Sam, Comdr., USN  
CHARIF, Benson S., Comdr., USN  
CHASE, John F., Capt., USN  
COFFEY, John D., Jr., Comdr., USN  
COFFMAN, Graham M., Comdr., USN  
CONNOR, Richard B., Comdr., USN  
COUNTRY, John C., Comdr., USN  
CUMMINS, John P. J., Jr., Comdr., USN  
CUNNINGHAM, Robert E., Jr., Comdr., USN  
CURTIN, Leo V., Comdr., USN  
CUTLER, Garnet C., Comdr., USN  
DARMSTAETTER, A. A., Jr., Comdr., USN  
DAUGHERTY, Phillip V., Comdr., USN  
DAVIS, Harold A., Comdr., USN  
DAVIS, Jasper W., Comdr., USN  
DAVIS, John R., Jr., Comdr., USN  
DAVIS, Tudor B. C., Comdr., USN  
DAVIS, William D., Jr., Comdr., USN

DEAN, George W., Comdr., USN  
DEAS, Thomas C., Comdr., USN  
DEMAILLY, Robert G., Comdr., USN  
DIKLICH, Milan, Jr., Comdr., USN  
DIMMETTE, Robert M., Comdr., USN  
DINEEN, James R., Comdr., USN  
DIXON, David C., Comdr., USN  
DOBBINS, Richard F., Comdr., USN  
DREWEL, Everett L., Comdr., USN  
DROEGE, Fred D., Comdr., USN  
DUFF, Adolphus W., Comdr., USN  
EBY, Edwin G., Comdr., USN  
ECHOLS, Raymond S., Comdr., USN  
ELKIND, Maurice P., Comdr., USN  
ELLES, John V., Comdr., USN  
ELSON, Ralph, Comdr., USN  
ERRICH, Arthur R., Capt., USN  
ESJWEIN, John G., Comdr., USN  
EVANS, Willis F., Comdr., USN  
FEATHERSTON, John S., Comdr., USN  
FIRGVED, James W., Capt., USN  
FITZGIBBONS, Robert J., Comdr., USN  
FLACK, Hugh A., Comdr., USN  
FLIESCHAKER, Robert J., Comdr., USN  
FLIPSE, Martin E., Jr., Comdr., USN  
FOLCK, William P., Comdr., USN  
FOULK, Richard, Comdr., USN  
FOWLER, Nathaniel E., Comdr., USN  
FRANKEL, Donald B., Comdr., USN  
FRANKHAUSER, Robert K., Comdr., USN  
FRASER, Alan W., Comdr., USN  
FRASER, William E., Comdr., USN  
FULLER, Frank D., Comdr., USN  
FULTZ, Robert E., Comdr., USN  
FUTERNICK, Benjamin, Comdr., USN  
GAUDER, Peter J., Comdr., USN  
GAY, Leonard A., Comdr., USN  
GETT, Phillip O., Comdr., USN  
GELBIN, Ruchl M., Comdr., USN  
GERBASI, Francis S., Comdr., USN  
GERLING, John J., Comdr., USN  
GILLEM, Norbert P., Comdr., USN  
GILLESPIE, David G., Comdr., USN  
GOLDBLUM, Abraham D., Comdr., USN  
GRANT, Benjamin F., Comdr., USN  
GREANEY, Martin O., Jr., Comdr., USN  
GREENBERGER, Sidney, Comdr., USN  
GREER, James W., Comdr., USN  
GREINER, David J., Comdr., USN  
GRENNING, Roy R., Comdr., USN  
GRIFFIN, William D., Comdr., USN  
GRINNEY, Leo R., Comdr., USN  
GROSS, Isadore, Comdr., USN  
HAGUE, James D., Capt., USN  
HALL, William A., Comdr., USN  
HAGLER, Carl W., Comdr., USN  
HAMILTON, James R., Comdr., USN  
HANSEN, Walter F., Comdr., USN  
HARDY, William P., Comdr., USN  
HARRIS, James H., Comdr., USN  
HART, Dale E., Comdr., USN  
HARTLEY, George T., Capt., USN  
HASEGAWA, Junji, Comdr., USN  
HELGERSON, Arthur A., Comdr., USN  
HENDRICKS, Frank R., Comdr., USN  
HERMAN, Julius W., Comdr., USN



# MEDICAL CORPS--Continued

SCHMOYER, Maurice R., Jr., Comdr., USN  
 SCHNEIDER, Peter W., Comdr., USN  
 SCHWENKER, Harry F., Jr., Comdr., USN  
 SCARS, Richard H., Comdr., USN  
 SEDERSTROM, Leslie W., Comdr., USN  
 SEIBERT, Virgil E., Comdr., USN  
 SEIGMAN, Edwin L., Comdr., USN  
 SEMMENS, James P., Comdr., USN  
 SHAPIRO, Herman S., Comdr., USN  
 SHARP, Robert W., Jr., Comdr., USN  
 SHECHTER, Nathan, Comdr., USN  
 SHERER, Bernard D., Comdr., USN  
 SHOOK, Daniel M., Comdr., USN  
 SIEVER, Paul W., Comdr., USN  
 SIWEK, Stanley J., Comdr., USN  
 SKROCK, Eugene E., Comdr., USN  
 SLADE, Erwin R., Comdr., USN  
 SMITH, David S., Comdr., USN  
 SMITH, Edward M., Jr., Comdr., USN  
 SMITH, Francis M., Jr., Comdr., USN  
 SMITH, Leonard K., Comdr., USN  
 SMITH, Richard D., Comdr., USN  
 SMOLEN, Elwyn M., Comdr., USN  
 SPENCER, George E., Comdr., USN  
 SPENCER, James L., Jr., Capt., USN  
 SPENCER, James T., Comdr., USN  
 SPICHER, Robert W., Comdr., USN  
 STARZYNSKI, Thaddeus E., Comdr., USN  
 STASHAK, Frank J., Jr., Comdr., USN  
 STILSON, Carter, Comdr., USN  
 STEELE, Marshall K., Jr., Comdr., USN  
 STEIN, Melvin, Comdr., USN  
 STONESTREET, Marsh P., Comdr., USN  
 STRUNK, William M., Comdr., USN  
 SUESS, John F., Comdr., USN  
 SVIGALS, Chester S., Comdr., USN  
 SWARTS, Jerome M., Comdr., USN  
 SZASZ, Thomas S., Comdr., USN  
 TABER, Thomas H., Jr., Comdr., USN  
 TAYLOR, George J., III, Comdr., USN  
 TAYLOR, George W., Jr., Comdr., USN

THORN, James I., Comdr., USN  
 THERR, Stephen G., Comdr., USN  
 THOMPSON, Tom P., Comdr., USN  
 THOMPSON, William S., Comdr., USN  
 TISDALE, Raphael E., Comdr., USN  
 TODD, Donald P., Comdr., USN  
 TOMLIN, Edwin M., Comdr., USN  
 TRATAR, Anton A., Comdr., USN  
 TUCHMAN, Joseph H., Comdr., USN  
 TYLER, Lockland V., Jr., Comdr., USN  
 VAINDER, Milton, Comdr., USN  
 VALUSEK, Fred A., Comdr., USN  
 VAN PETTEN, George T., Comdr., USN  
 VARGISH, Jacob J., Comdr., USN  
 WADE, Franklin G., Comdr., USN  
 WALLACE, Raymond A., Capt., USN  
 WALLNER, Ernest F., Jr., Comdr., USN  
 WALSH, Robert E., Comdr., USN  
 WALTER, Herbert L., Comdr., USN  
 WANNEMACHER, Paul H., Comdr., USN  
 WATKINS, Elton, Jr., Comdr., USN  
 WATSON, Alan D., Comdr., USN  
 WATTERS, Lorral E., Jr., Comdr., USN  
 WEBBHAUS, James, Comdr., USN  
 WELLS, Arthur H., Comdr., USN  
 WERNER, William A., Comdr., USN  
 WERTHEIMER, Haskell, Capt., USN  
 WEST, Charles D., Comdr., USN  
 WHITESIDE, James E., Comdr., USN  
 WIEGAND, Frederick G. F., Comdr., USN  
 WILBUR, Carl E., Capt., USN  
 WILLARD, Burton, Comdr., USN  
 WILLIAMS, Robert G. W., Jr., Comdr., USN  
 WILSON, Jay D., Comdr., USN  
 WILSON, Paul E., Comdr., USN  
 WILSON, Theodor H., Jr., Comdr., USN  
 WITHERS, Sydnor T., Comdr., USN  
 ZARRIELLO, Jerry J., Comdr., USN  
 ZIMMERMAN, Burton M., Comdr., USN  
 ZORN, George G., Jr., Comdr., USN

## DENTAL CORPS

ANDERSON, Murray O., Capt., USN  
 ANDERSON, Robert A., Comdr., USN  
 ARMSTRONG, Lloyd M., Comdr., USN  
 ASHWELL, James T., Capt., USN  
 BACEVICZ, Frank J., Comdr., USN  
 BARKER, Irvin R., Capt., USN  
 BERGEN, Samuel F., Capt., USN  
 BERNARD, Damon E., Capt., USN  
 BERNHAUSEN, Elwood R., Comdr., USN  
 BIGELOW, Gilbert P., Capt., USN  
 BISHOP, Ralph M., Comdr., USN  
 BLACKWOOD, Robert M., Capt., USN  
 BLANCHERI, Raymond L., Capt., USN  
 BOHN, Clayton L., Capt., USN  
 BOTWINICK, Leo, Comdr., USN  
 BRADSHAW, Frederic H., Capt., USN  
 BRANDON, William C., Jr., Capt., USN  
 BRENNING, Leo F., Capt., USN  
 BRIERLEY, Delmas E., Capt., USN  
 BRIGANCE, Frederick W., Comdr., USN  
 BRO, Robert L., Comdr., USN  
 BULT, Robert G., Comdr., USN  
 BURDETTE, Obed D., Capt., USN  
 BURNETT, Robert F., Capt., USN  
 CAMPBELL, Walter E., Capt., USN  
 CARMEN, Marvin, Comdr., USN  
 CARNEY, Bruce H., Capt., USN  
 CASTLE, George E., Comdr., USN  
 CASTNER, David V., Jr., Comdr., USN  
 CAVE, Amos W., Jr., Comdr., USN  
 CHAPMAN, Judoe C., Capt., USN  
 CHUDZYNSKI, Joseph G., Comdr., USN

CLARK, Wayne J., Capt., USN  
 COLLINS, Robert S., Capt., USN  
 COOK, Francis W., Capt., USN  
 COSTA, Angelo B., Capt., USN  
 COUVILLON, Wade E., Jr., Capt., USN  
 CROLIUS, William E., Jr., Capt., USN  
 CROSSMIRE, George B., Comdr., USN  
 CUNNINGHAM, Shas D., Capt., USN  
 CURRERI, Rosolino J., Capt., USN  
 DAVIS, Frank L., Comdr., USN  
 DOBYNS, Frank D., Capt., USN  
 DODDS, Donald W., Capt., USN  
 DOYLE, Eymard L., Comdr., USN  
 DUDLEY, George E., Capt., USN  
 DWYER, William D., Capt., USN  
 ENKE, Loren F., Comdr., USN  
 FEDER, Harold W., Capt., USN  
 FELCYN, Walter V., Capt., USN  
 FERNANDEZ, Sergio, Capt., USN  
 FERRIS, John B., Capt., USN  
 FLOCKEN, John E., Capt., USN  
 FOIT, Donald F., Comdr., USN  
 FRANTZ, Leroy R., Capt., USN  
 FRIDLEY, Harry H., Capt., USN  
 FRIEST, Raymond H., Capt., USN  
 GABRELS, Wilton R., Comdr., USN  
 GALLAGHER, Walter N., Capt., USN  
 GARDNER, Edward N., Capt., USN  
 GARGIULO, Edward A. H., Capt., USN  
 GELB, Martin J., Capt., USN  
 GEMSON, Sidney, Capt., USN  
 GLASNER, Irving S., Comdr., USN



## Reviews of Recent Books

UNITED STATES ARMY IN WORLD WAR II. The Technical Services. The Medical Department: Hospitalization and Evacuation, Zone of Interior, by *Clarence McKittrick Smith*. 503 pages; illustrated. Prepared by the Office of the Chief of Military History, Department of the Army, Washington, D. C., 1956. For sale by the Superintendent of Documents, Government Printing Office, Washington, D. C. Price \$4.

This volume contains a detailed and lucid analysis of the complex problems that faced The Surgeon General in his efforts to administer the hospitalization and evacuation system of the Army in the Zone of Interior during World War II. Thus the problems dealt with are those of medical administration and logistics rather than those of clinical care. They were problems partly of his own making, but were in large part an inevitable corollary of those faced by a military organization—catapulted suddenly to 8 million strong—fighting a global war.

The narrative reflects the broad historical pattern of all the elements of the fighting organization in World War II: the initial unpreparedness—the early period of improvisation followed by attempts to clarify and standardize procedures—and the evolution of new policies and procedures to meet the changing requirements of global warfare.

The discussion is directed solely toward plans, policies, and operations at the level of Surgeon General of the Army, and the narrative "written from his vantage point." A delimitation of scope is necessary, but two observations are pertinent. First, this precludes any account of the viewpoint of the patient—1 individual out of a potential 8 million—caught up in the vast and impersonal "system" designed to maintain combat effectiveness. The reader misses the human element. Second, this delimitation has precluded more than an over-simplified statement of facts about situations peripheral to the Surgeon General's Office. For example, the bare statement that the Air Staff "remained nonetheless unconvinced of the wisdom or desirability of pressing for separate air forces hospitals generally" (p. 175), even in context, does not do justice to a complicated subject. The problem of how much to generalize is, of course, a thorny one for any scholar, and probably no two could ever agree on the exact balance to strike.

The organic structure of the volume is sound, and the complex narrative moves along smoothly. There is a great deal of attention given to detail and documentation which should be of value to future planners. The author has avoided the pitfall of partisanship, and in the mellowed perspective of time has treated colorful and controversial figures with impeccable restraint. This volume, along with other military medical volumes of the period, will form a basic reference library for the serious student or planner. —*MAE M. LINK, Ph. D.*



**ESSENTIALS OF DERMATOLOGY**, by *Norman Tobias*, M. D. 5th edition. 651 pages; 211 figures; 11 subjects in color. J. B. Lippincott Co., Philadelphia, Pa., 1956. Price \$8.

This textbook for medical students and general practitioners has been widely used since the first edition appeared in 1941. It does not pretend to exhaustively discuss the etiologic, physiologic, pathologic, diagnostic, and therapeutic aspects of diseases of the skin. It is a brief, practical, and useful text for the student and practitioner.

The book is well illustrated with both black and white and colored plates, and the printing is excellent. Organization of the subject matter is practical and useful. Particularly helpful to the nonspecialist is the section included in each chapter on those aspects of nursing that are particularly germane to the diseases considered.

The chapter on general therapeutic suggestions will prove to be a most helpful guide to the beginner.

Dr. Tobias again has succeeded in presenting a wide and difficult subject in a concise and readable form, yet complete enough for everyday use. This book is highly recommended for students of medicine and the nonspecialist — *VICTOR R. HIRSCHMANN, Col., MC, USA*

**SYMPOSIUM ON MYASTHENIA GRAVIS.** Papers read at the First International Conference on Myasthenia Gravis, at Philadelphia, Pa., on December 8-9, 1954, under auspices of The Myasthenia Gravis Foundation, Inc., New York, *Henry R. Viets*, M. D., and *George D. Gammon*, M. D., Guest Editors. 742 pages; illustrated. Distributed by The Myasthenia Gravis Foundation, Inc., New York, N. Y., 1955.

This symposium includes 18 manuscripts read at the First International Conference on Myasthenia Gravis at Philadelphia, 8-9 December 1954, under the auspices of the Myasthenia Gravis Foundation.

All the papers are rather brief and to the point. There is a statement of the clinical problem, followed by discussions of the pharmacologic aspects of neuromuscular transmission, pathophysiology of the disorder, the relation of the thymus to the disease, drug therapy and special features of management including thymectomy, myasthenic and cholinergic crises, and pregnancy in myasthenia gravis. The quality of this group of papers reminds one of the excellent series published on neuromuscular disorders by this same journal in 1953.

This symposium is recommended and should be useful to physicians who have the responsibility for the management of patients with myasthenia gravis. — *JOHN W. KEMBLE, Col., MC, USA*

**SYNOPSIS OF GYNECOLOGY**, Based on the Textbook *Diseases of Women*, by *Robert James Crossen*, M. D., F. A. C. S. 4th edition. 255 pages; 132 illustrations, including frontispiece in color. The C. V. Mosby Co., St. Louis, Mo., 1956. Price \$5.25.

The author states in his preface that the synopsis is intended primarily as a less expensive volume for the student who does not wish

to purchase a larger, more detailed, and expensive textbook. It is also his intent to provide the general practitioner with a small and ready reference guide for the recall of basic principles in diagnosis and treatment of gynecologic disorders as encountered in daily practice.

These intentions have been successfully accomplished, and this book aptly fills an additional need which has been encountered by this reviewer; namely, for a very complete and general review of gynecology as would be desired by the general surgeon, particularly in the armed services, who may encounter few gynecologic conditions in his daily work. To the end that it supplies factual and handy statistical data and many excellent outlines and illustrations, it will serve the young teaching associate in gynecology as an excellent, quick pocket reference. The coverage of the field is most thorough while controversial points and full details are left to the larger text.

—JOHN A. PEASE, *Comdr., MC, USN*

**BRAIN MECHANISMS AND CONSCIOUSNESS**, A Symposium organized by The Council for International Organizations of Medical Sciences. Established under the joint auspices of UNESCO and WHO. Consulting Editors: *Edgar D. Adrian, Frederic Bremer, and Herbert H. Jasper.* Editor for the Council: *J. F. Delafresnaye, C. I. O. M. S., Paris, France.* 556 pages; illustrated. Charles C Thomas, Publisher, Springfield, Ill., 1954. Price \$8.50.

This symposium presents the combined efforts of outstanding research workers from the fields of neuroanatomy, neurophysiology, neurosurgery, psychiatry, and psychology to clarify the scientific knowledge surrounding the neurologic basis of conscious mental processes and behavior. The study utilizes a wealth of new data obtained by serious, painstaking research. Recognizing that communications between various scientific disciplines always present difficulties and that the problem of consciousness in its complexity will not at present yield a simple, common-sense analysis, each discussant in this symposium drives incisively to his points of value. All of the work done emphasizes the increasing importance of a complicated, integrating system between the cortex and subcortical formations, generally described as the centrencephalic system and composed of many topographic subcortical nuclei, association tracks, and diffuse arrangements of neurons.

Every physician and every research worker truly interested in the scientific understanding of the motivation of human behavior and the genesis of consciousness can gain greatly from a study of the various presentations. Particularly interesting to psychiatrists and psychologists will be articles on the psychologic, psychiatric, and psychoanalytic aspects of the problem of consciousness by such outstanding research scientists as L. S. Kubie, D. McK. Rioch, H. H. Jasper, A. E. Fessard, K. S. Lashley, and others. Detailed neuroanatomic, neurophysiologic, and neuropathologic presentations by H. W. Magoun, G. Moruzzi, E. D. Adrian, W. Penfield, W. Grey Walter, and others will

greatly interest research workers concerned with resolving the location of consciousness.

Since "consciousness is a primary fact of existence" (D. O. Hebb) and one can only know "the inner world of consciousness directly, the outer world only by inference from the inner data" (J. C. Eccles), it must be recognized that an understanding of consciousness requires both the observer and the observed. This symposium provides a ring-side seat from which either the observed or the observer can truly delve into the mystery of consciousness. This publication should be readily available as a reference book wherever serious study of brain mechanisms and consciousness is carried on.

—LUCIO E. GATTO, Col., USAF (MC)

ARTHROPLASTY, by *St. J. D. Buxton, M. D., B. S.* 126 pages; illustrated. J. B. Lippincott Co., Philadelphia, Pa., 1955. Price \$6.

This monograph is an attempt to cover the subject of arthroplasty of the various joints, including significant historical data and a review of recent contributions by other surgeons, and concluding with a cautious chapter of predictions on what the future holds. The bibliography is complete and includes most of the important literature on the subject.

Various joints are dealt with, but by far the greatest portion of the discussion is given to hip joint arthroplasty with the author submitting an evaluation of his own as well as other surgeons' results. His enthusiasm for the stem prosthesis with an acetylic head is not shared by a large number of orthopedic surgeons in the United States.

The chapters on the principles of postoperative treatment and rehabilitation are reasonably complete. The instructions are rather general and will be most helpful to those who are already acquainted with the trials encountered in the postoperative management of the reconstructed joint.

This monograph is recommended reading for orthopedists especially interested in the history of arthroplasty. The remainder makes interesting reading but falls somewhat short of being a classic reference work in the field.—CLIFFORD A. STEVENSON, Capt., MC, USN

JOINT LIGAMENT RELAXATION TREATED BY FIBRO-OSSEOUS PROLIFERATION, by *George Stuart Hackett, M. D.* With special reference to low back disability, trigger point pain and referred pain. 97 pages; illustrated. Charles C Thomas, Publisher, Springfield, Ill., 1956. Price \$4.75.

The author has presented in monograph form his views on the anatomy, etiology, pathology, diagnosis, and treatment of painful joints. Based on 16 years of experience in therapy, including administration of over 3,000 injections, he has concluded that both local and referred pain in low back disability and in that of other joints is due to ligamentous instability. The methods of accurate diagnosis and localization of the trigger points are clearly described and stressed. Phe-

nominal cures of all these conditions were obtained by the injection of these trigger points with a fibro-osseous proliferant, a wonderful procedure if it can be reduplicated by other physicians treating the same type of conditions.

The author has very adequately expressed his views and presented convincing evidence to support the soundness of his treatment but at times is repetitious. The book is satisfactorily illustrated with 17 black-and-white and line drawings.

The author has assumed that all physicians ignore the anatomy, function, and treatment of injuries to the ligamentous structure of joints. Although this may be an extreme view, too often the adequate treatment for ligamentous injuries is neglected. This results in complications which are considered and treated as separate entities without due regard to their primary cause.

This book should be read by every physician and be available for ready reference to every physician who treats the residuals of joint trauma.—JOSEPH W. BATCHELOR, Col., MC, USA

THE MEDICAL DEPARTMENT OF THE UNITED STATES ARMY, *Preventive Medicine in World War II. Volume III: Personal Health Measures and Immunization.* 394 pages; illustrated. Prepared in the Historical Unit, Army Medical Service, Editor-in-Chief, Colonel John Boyd Coates, Jr., MC. Editor for Preventive Medicine, Ebbe Curtis Hoff, Ph. D., M. D., Office of the Surgeon General, Department of the Army, Washington, D. C., 1955. For sale by the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C. Price \$3.25.

This third volume in the series on "Preventive Medicine in World War II" covers the general field of health measures and immunization. The subject is broken down into chapters dealing with manpower selection, personal hygiene, clothing, nutrition, malnutrition and deficiency diseases, preventive psychiatry, accidental trauma, and immunizations.

The authors have, in narrative fashion, detailed the experiences, mistakes, and repetitive efforts of the past in relation to these various aspects of personal health measures. Each chapter is a condensation of a mass of reference material boiled down sufficiently to prevent the reader from becoming mired in detail. For those who wish to study the subject of each chapter in more detail the source material is listed accurately at the foot of each page.

Here in one volume reposes a wealth of information on the trials, errors, and accomplishments of the past which, but for their compilation in this book, would be lost to those responsible for planning for the future. Whether read by military or civilians, all of the chapters are interesting, and some are fascinating, not only in content but in style.

The chapter on clothing is introduced by an explanation of the physics and physiology involved in the control of temperature and

humidity problems as related to the body. A thorough understanding of this chapter by all medical and line officers will eliminate in the future much of the effective time lost in past wars from such related injuries as trench foot.

If this volume had not been compiled, it is conceivable that many of the mistakes of the past war would be repeated for lack of a single source of material on these subjects. In most chapters the experiences and developments are discussed in general and also in relation to war theaters. This is of additional aid to those seeking guidance in developing a global preventive medicine program.

—LESTER P. VEIGEL, Col., USAF (MC)

THE YEAR BOOK OF DRUG THERAPY (1955-1956 Year Book Series), edited by Harry Deckman, M. D. 560 pages; illustrated. The Year Book Publishers, Inc., Chicago, Ill., 1956. Price \$6.

This yearbook, published each January, is based on the material in journals received through the preceding August.

The book is divided into sections on antibiotics and sulfonamides, cardiovascular diseases, surgery, et cetera, and within each section articles concerning new drugs, new information about old drugs, or new therapeutic approaches to particular diseases are abstracted. Editorial footnotes call attention to particularly notable deficiencies of or value in the articles abstracted in an attempt to tie isolated findings together and to give a more complete therapeutic concept. Articles reinforcing or contradicting each other are frequently reviewed together editorially.

This format plus a good index make this book the best available reference or review. Its yearly publication ensures current information, and the large number of both domestic and foreign journals reviewed guarantees coverage of any particularly important innovations. The book should be in all medical libraries and is heartily recommended to all physicians, from internes to specialists.

—CHRISTIAN GRONDECK, Lt. Col., MC, USA

DISEASES OF THE LIVER, Edited by Leon Schiff, M. D., Ph. D., with the collaboration of 27 contributors. Foreword by Cecil J. Watson, M. D., Ph. D. 738 pages; illustrated. J. B. Lippincott Co., Philadelphia, Pa., 1956. Price \$16.

Advances in our knowledge of the liver, its diseases and their treatment, have been sufficient to warrant compilation in this sizable volume. The most important recent developments are said to be in the following fields: (1) knowledge of basic structure and function of the liver, (2) experimental production of liver disease, (3) viral hepatitis, (4) hepatic coma and nitrogen metabolism, (5) pathogenesis and treatment of cirrhosis, (6) treatment of hemochromatosis by phlebotomy, (7) copper metabolism in Wilson's disease, (8) needle biopsy of the liver, and (9) surgery for portal hypertension. Twenty-eight eminent workers have written on those aspects of liver disease in which they are well-

known experts. No single author could authoritatively cover all of this material before it became history. Dr. Schiff has so skillfully edited this book that it presents a balanced and thorough treatment of the subject, covering all important features without the omission of significant areas.

The gross and microscopic anatomy, physiology, and biochemistry of the liver are considered in 92 pages, followed by a chapter on experimental hepatic injury and three chapters on diagnosis and diagnostic tests and methods. The remaining 500 pages are devoted to disease entities and syndromes.

The focus of the book is predominantly clinical, and with few exceptions the contributors are persons whose daily activities devolve around the diagnosis and treatment of patients with liver disease. This book will be an extremely useful tool for anyone concerned with patients who have hepatic disease.

—BENJAMIN H. SULLIVAN, Jr., Col., MC, USA

A MANUAL OF FRACTURES AND DISLOCATIONS, by *Barbara Bartlett Stimson*, M. D., Med. Sc. D. 3d edition. 224 pages; 97 illustrations. Lea & Febiger, Philadelphia, Pa., 1956. Price \$4.50.

This book is a brief introduction to the subject of fractures and dislocations. It is written in an informal style with proper emphasis on conservative treatment of fractures, and occasionally indications are given for more radical intervention. The book is divided into a section on general treatment principles, followed by sections related to anatomic distribution of injury. Line drawings which are concise and clear are used as illustrative material, but methods mentioned in the text are not in all instances illustrated. This is especially true of the management of fractures by traction, and this discrepancy would lead to error unless other texts were used. Each fracture is briefly discussed as to diagnosis, etiology, incidence, treatment, and prognosis. It must be said, however, that in most instances the prognoses in patients with fractures are somewhat optimistic, and periods of immobilization for joint dislocations are unusually short. It is stated that a dislocated shoulder, for instance, need only be immobilized by a sling and swathe for a few days. This small text could serve well as an introduction to the treatment of fractures and dislocations for medical students and could be used as a guide for instruction. However, confronted with the problem of management of any specific fracture, one could hardly find enough material in this book and would be forced to seek other sources for guidance in definitive management.

—STERLING J. RITCHEY, Col., MC, USA

DISEASES OF THE LIVER AND BILIARY SYSTEM, by *Shelia Sherlock*, M. D. (Edin.). 720 pages; illustrated. Charles C Thomas, Publisher, Springfield, Ill., 1955. Price \$10.

In this clear and practical guide to hepatic and biliary disorders, the author, an experienced authority, has used the functional approach. Throughout, the emphasis is on the disturbance of liver (and biliary)

function, yet the laboratory is kept in proper balance with bedside observation.

There are numerous excellent illustrations, and the large type and attractive use of bold and italic faces make this book exceptionally easy to read.

A special word of thanks should be offered Dr. Sherlock because she has managed to describe a subject of great complexity with admirable simplicity. In fact, American authors could learn a great deal from a study of this model of English medical literature.

Because of the interrelations between the liver and all metabolic disturbances and because of the many types of primary and secondary hepatic disturbances the discussions are, in many instances, relatively brief. Nevertheless practically all the essential information is presented. Therefore, this book will certainly appeal to the student, house officer, and practitioner. The research investigator would use the book for a handy reference, although he may have to refer to experimental papers for certain details. The text can be strongly recommended to all readers.—S. O. WAIFE, Lt. Comdr., MC, USNR

**AN ATLAS OF OTOLARYNGIC PATHOLOGY.** By Colonel J. E. Ash, USA (Ret.), M. D., and Muriel Raum, M. D., Published under the joint sponsorship of the American Academy of Ophthalmology and Otolaryngology, The American Registry of Pathology, and The Armed Forces Institute of Pathology. 572 pages; 2,024 figures on 420 plates. American Registry of Pathology, Washington, D. C., 1956. Price \$20.

This is an extensive volume that covers a variety of lesions found in the general field of pathology in addition to diseases of the respiratory tract, neck, and ear. The format of the book is excellent, and for the most part the many black and white photomicrographs are clear and readily understandable.

The first part is devoted to a section on general pathology and presents a variety of subjects such as inflammation, pigmentation and degeneration, deficiency diseases, miscellaneous diseases of bone, and dermatoses. This section, I believe, could be deleted as it is adequately covered in the texts of general pathology readily available. However, on the whole the field of otolaryngic pathology is more extensively covered than could be found anywhere else. The plates on diseases and tumors of the ear are particularly good and well documented. This book will be a ready reference to the general pathologist as well as the otolaryngologist.—VERNON E. MARTENS, Capt., MC, USN

**ROENTGEN INTERPRETATION OF FRACTURES AND DISLOCATIONS,** by Joseph Levitin, M. D., and Ben Colloff, M. D. 265 pages; illustrated. Charles C Thomas, Publisher, Springfield, Ill., 1956. Price \$8.50.

In this first edition, a roentgenologist and an orthopedic surgeon have collaborated to produce a precise and practical guide to the reduction and immobilization of fractures. The title of the book is somewhat misleading. As stated in the foreword, the main purpose of the book is to

describe what constitutes generally accepted satisfactory reduction with emphasis on the important alignments to be restored or preserved as an aid to the roentgenologist.

The book serves as a handy reference of the essential normal x-ray anatomy of the more common sites of fracture and dislocation, the deformities usually produced by fracture or dislocation, the accepted position of reduction, and the usual time of immobilization. Methods of reduction, means of immobilization, and x-ray evidence of healing progress or complications are not included, except for several reproductions of roentgenograms demonstrating normal and abnormal healing progress in fractures of the femoral neck.

Aside from the 16 reproductions of hip roentgenograms, the parts are represented by diagrams which include only the essential anatomy and which are adequately labeled. Several errors in labeling are noted. Approximately 50 per cent of the text is devoted to the diagrams. Fractures of the skull and facial bones are not included. Fractures and dislocations of the spine are treated rather sketchily in a total of 18 pages as compared to 10 pages devoted to traumatic dislocation of the hip. Included as Appendix A are two pages of "bone age charts." Appendix B consists of five pages of line drawings of common appliances used in internal fracture fixation.

Although this volume is not intended as a complete reference book, it adequately serves the limited purpose intended by the authors.

—DELL F. DULLUM, Col., MC, USA

**CLINICAL ELECTROCARDIOGRAPHY, Part 1, The Arrhythmias, With an Atlas of Electrocardiograms, by Louis N. Katz, M. D., and Alfred Pick, M. D. 737 pages; 415 illustrations. Lea & Febiger, Philadelphia, Pa., 1956. Price \$17.50.**

This text on arrhythmias constitutes Part 1 and presumably Volume 1 of others to follow on the subject of clinical electrocardiography by the authors. Much of the basic material is an expansion of that contained in the chapter on arrhythmias as published in the second edition of *Electrocardiography*, a text prepared by the senior author in 1946. The original material has been expanded to include advances and some of the newer concepts. Old illustrations and legends have been revised and many new ones have been added. New chapters dealing with dynamics of cardiac arrhythmias, principles of therapy, general aspect of block, and arrhythmias in the pre-excitation syndrome and those in the dying patient also have been added. Two useful appendices are added, the first concerning technic in the diagnosis of arrhythmias, the second containing a detailed coding system.

The contents are divided into two sections. Section 1, consisting of six short chapters, discusses the general aspects essential to prepare the reader for the detailed considerations of the individual disturbances of rhythm, which constitute Section 2. A bibliography is given at the end of Section 1 and at the end of each of the 10 chapters



constituting Section 2. The general plan of this book has been to separate the text from the illustrative electrocardiograms, the latter being placed at the end of each chapter. Each illustrative tracing has an extensive explanatory legend and can be used without reference to the text. The reader will find an analogue of most, if not all, of the records he is likely to encounter. Inasmuch as 497 pages are used solely for figures and legends, this publication is more of an atlas than a textbook.

There are disappointments in this new volume. In the theoretic discussions, the authors do not give due consideration to the unitary theory of origin of atrial arrhythmias. They ignore the existence of acceleration of conduction through the A-V nodal tissues, in spite of the fact that pages are given to discussion of delayed conduction through these same tissues. No reference is given in the extensive bibliographies to the recent work of Prinzmetal on these subjects. The authors apologize to some extent for this omission in the preface by stating: "We are well aware that some of the views expressed in this volume are not entirely in agreement with the concepts that are held by other serious workers in the field of arrhythmias." This, however, will not help the uninformed reader who will be unable to reconcile the terminology and ideas he reads in current literature with this "current text." Likewise, it is unfortunate that the terminology "auricular flutter and fibrillation" was used instead of the more correct and acceptable term of "atrial flutter and fibrillation."

—THOMAS F. MATTINGLY, Col., MC, USA

**OPERATIVE TECHNIC IN SPECIALTY SURGERY**, edited by Warren H. Cole, M. D., F. A. C. S., with 67 contributing authors. A Companion Volume to *Operative Technic in General Surgery*, published Oct. 1955. 2d edition. 967 pages; illustrated. Appleton-Century-Crofts, Inc., New York, N. Y., 1956. Price \$20. (\$37.50 for the 2-volume set).

This is the second edition of this fine work which covers the specialty fields of cardiovascular and thoracic surgery, plastic and reconstructive surgery, operative orthopedic surgery, neurosurgery, gynecologic surgery, and surgery of the male genito-urinary system. The greatest changes occur in the new edition in the fields of cardiovascular and thoracic surgery, and the chapter on plastic and reconstructive surgery has been greatly changed and improved.

In view of the present complexity in the fields of specialty surgery, the important function of a book of this type is to provide the general surgeon with a bird's-eye view of present operative methods, admitting that the minutiae and patient care cannot possibly be consolidated in one volume. The book has accomplished this objective in a superb manner. As such, it becomes a useful handbook for a general review of specialty surgery, and for beginning a more detailed study using the fine bibliography appended to each chapter.

The sections on thoracic surgical subjects include complete descriptions of modern operations on the heart, aorta, and lungs. Details

are given of such current technics as aortic resection, cardiac resuscitation, extracorporeal circulation, and repair of cardiac septal defects. Possibly the bird's-eye view of this important field could be improved by a modicum of editing. For example, the excellent sections on vascular injuries and pleuropulmonary operations could stand expansion at the expense of such items as the discussion of endo-aneurysmorrhaphy, of historic interest only, and the statistical polemic on results after operation for coronary artery disease. To me, the latter sections seem out of place in this kind of book.

The section on plastic and reconstructive surgery has been greatly enlarged and improved over the previous edition, and also includes a detailed description of genetal surgery of the neck.

This is an excellent edition, and of great value to the general surgeon. The quality of printing, binding, and halftone reproduction is excellent. It would be interesting to know whether the replacement of many of the halftone illustrations by suitable line drawings would reduce the price of this important volume to make it more readily available to the young surgeon in training.—LEWIS L. HAYNES, *Capt., MC, USN*

Clinical Recognition and Management of DISTURBANCES OF BODY FLUIDS, by John H. Bland, M. D. 2d edition. 522 pages; illustrated. W. B. Saunders Co., Philadelphia, Pa., 1956. Price \$11.50.

This is a genuinely useful book. In it Dr. Bland has logically assembled the great body of information now available on the behavior of water and electrolytes in health and disease. With this information he has attempted to formulate a "practical pathophysiologic interpretation of metabolic deviations of water, electrolyte, and hydrogen ion metabolism in all disease states for clinical utilization at the bedside." He has succeeded to a remarkable degree. Basic considerations are discussed in five chapters. Other entire chapters are devoted to separate discussions of fluid and electrolyte problems in relation to circulatory failure, liver disease, pediatrics, pulmonary disease, geriatrics, surgery, renal disease, effects of heat, diabetes mellitus, adrenal insufficiency, corticotropin and corticoids, central nervous system injury and disease, and problems related to physical stress such as roentgen irradiation.

Nomenclature and concepts have been simplified as much as possible without sacrifice of scientific accuracy. Even so, a considerable fund of specialized knowledge is necessary for intelligent reading. Dr. Bland makes a strong plea for increased use of bedside observation and clinical judgment in treating the type of problems dealt with here. In doing this, he makes statements which may appear to question the practical value of adjunctive laboratory means such as the flame photometer. This is regrettable but undoubtedly unintentional. Since these things are becoming increasingly available, even under relatively modest circumstances, it would be unfortunate if any clinician were discouraged from becoming sufficiently acquainted with them.

The author's style is clear and interesting, and he makes good use of the teaching device of repetition. Documentation is good and excellent tables, charts, and illustrations have been liberally provided. Many "cartoon" type illustrations are provided as a supplement to the text and the conventional diagrams. Indexing is adequate but could be improved by indexing authors separately. This book is highly recommended reading for all physicians and medical students.

—JOHN K. SPITZNAGEL, Lt. Col., MC, USA

**SUBPHRENIC ABSCESS**, by H. R. S. Harley, M. S., F. R. C. S. A Monograph in The Bannerstone Division of American Lectures in Surgery, edited by Michael E. DeBakey, M. D., and R. Glen Spurling, M. D. Thoracic Surgery Division, edited by Brian Blades, M. D. 216 pages; illustrated. Charles C Thomas, Publisher, Springfield, Ill., 1955. Price \$7.

This monograph is based on a study of the records of 188 patients suffering from subphrenic abscess and on a study of the literature. The subject matter concerns the author's concept of the anatomy of the subphrenic region. The pathway of infection to this region is explained and the way infection may spread across the diaphragm in either direction is discussed. The value of radiologic examination and the changes produced by an abscess under the diaphragm are described.

The symptoms, signs, and clinical varieties of subphrenic abscess and the other complications so commonly found in these patients are given lengthy consideration. Also the influence of complications on the clinical picture and on the mortality is stressed. The condition of subphrenitis without abscess formation, which gives rise to all the constitutional and local changes produced by a subphrenic abscess except those of a space-occupying lesion or of a gas-containing cavity, is described. Constitutional and local signs of infection may subside due to treatment with chemotherapeutic agents and do not recur. If resolution of the constitutional and local features of infection does not take place or if, after treatment is stopped, they recur, the presence of an abscess must be assumed, provided other complications are not present, and drainage should be instituted without delay.

Special reference to the importance of chemotherapy and to the route of drainage of subphrenic abscess is made. A plea for the universal adoption of extraserous approaches to the subphrenic spaces is made by showing the difference in mortality between the trans-serous and extraserous drainage.

The author has shown that, with early diagnosis, localization, and correct treatment, the mortality of subphrenic abscess should not exceed 10 per cent. This book summarizes the subject of, and the literature on, subphrenic abscess and is a ready reference for the treatment of the occasional case occurring in the experience of each physician and surgeon. The illustrations are good, and the book is adequately indexed and contains an excellent bibliography.

—HERBERT T. BERWALD, Col., MC, USA

COLLECTED PAPERS ON AVIATION MEDICINE. AGARDograph No. 6. Presented at Aeromedical Panel Meetings of the Advisory Group for Aeronautical Research and Development, Palais de Chaillot, Paris. Published for and on behalf of Advisory Group for Aeronautical Research and Development, North Atlantic Treaty Organization. 218 pages. Interscience Publishers, Inc., New York, N. Y., 1955. Price \$5.

This book is a compendium of 18 technical papers presented at several meetings of the Advisory Group for Aeromedical Research and Development (AGARD). The topics range all the way from Atetic survival problems to night vision. Eleven of the papers are reprinted from the Fourth Meeting of the Aeromedical Panel, which met in London in September 1953. Four of the papers are in French; the rest are in English.

It is difficult to consider the collection of papers as a book, as they have little in common. A more rational approach is to consider each paper on its own.

There is a very complete paper entitled "Tolerance to Abrupt Deceleration" by John Paul Stapp, including his protocols and several hitherto unpublished photographs. This makes this book a must for those interested in the subject of deceleration. The book is dominated by the 50 pages of text and 23 pages of illustrations devoted to this article.

Three of the authors are from the Royal Air Force Institute of Aviation Medicine at Farnborough. Ruffel Smith discusses aircraft cockpits from the anthropometric standpoint. There is a short article on the physiologic requirement of pressure cabins by Roxburgh, and an interesting article on rapid decompression by Fryer.

A paper entitled "Recent Advances of Instrumentation of Interest in Aviation Medicine" puts in one place the information on pressure transducers, spectrometric methods of gas analysis by quantitative emission spectroscopy, and the Rahn-Otis technic and other methods of intermittent and continuous sampling of expired air. Such diverse topics are considered from the standpoint of instrumentation rather than the resultant findings; it is a refreshing approach and one of interest to the student in the field. The article is well annotated with references and covers some 30 pages.

There is an interesting discussion by Van Wulffren Palthe on a test for detecting epilepsy—a simple paper and pencil test. In fact, he hints that the test may induce an attack in a latent epileptic.

There are general papers by such well-known men in aviation medicine as Benson, Grandpierre, Lo Monaco, and Bergeret; these emphasize the international nature of AGARD meetings.

The information contained in some of the papers has been published elsewhere. Nevertheless the book is worth buying. The paper by Stapp gives the book particular value to individuals and institutions who are interested in collecting literature in aviation medicine.

—VINCENT M. DOWNEY, Col., USAF (MC)

**A TEXTBOOK OF ENDODONTOLOGY**, by *Edgar D. Coolidge*, M. S., D. D. S., LL. D. (Hon. Loyola), and *Robert G. Kesel*, D. D. S., M. S. 2d edition. 366 pages; 345 illustrations on 210 figures and 1 plate in color. Lea & Febiger, Philadelphia, Pa., 1956. Price \$7.50.

As stated in the preface, this volume was written because of "the desire of the author to present a text that will be helpful to both student and practitioner," and it offers the undergraduate dental student and general practitioner a clear, descriptive, and authoritative presentation of an important branch of health service.

The chapters devoted to therapeutics, dental caries, and the etiology of dental pain are lucid and well organized with excellent accompanying tables and illustrations. Of particular interest, especially to the military dental officer, is the chapter on dental pain experienced under conditions of low barometric pressure and during high-altitude flights, both actual and simulated.

The chapters devoted to vital and nonvital pulps, partial and complete pulp removal, and the filling of root canals are written in detail, with descriptive illustrations and tables. In conjunction with the clinical procedures, there is a thorough coverage of the latest techniques and drugs in antibiotic therapy. This is followed by an excellent discussion of the biologic and clinical support of the theory of focal infection and pulpless teeth.

The information in this volume is of great value in the treatment of pulp pathology and root canal therapy. The book is a necessary reference for the libraries of general practitioners and clinicians at military and dental facilities who wish to have available a concise treatise on the subject of endodontology, with a well-balanced treatment of sound, logical theory and exact clinical procedures.

—JOHN R. McEVROY, Lt. Col., USAF (DC)

**COLOR ATLAS OF ORAL PATHOLOGY**, Histology and Embryology, Developmental Disturbances, Diseases of the Teeth and Supporting Structures, Diseases of the Oral Mucosa and Jaws, Neoplasms. Prepared under the auspices of the U. S. Naval Dental School of the National Naval Medical Center, Bethesda, Md. 158 pages; 461 figures in color. J. B. Lippincott Co., Philadelphia, Pa., 1956. Price \$12.

This concise book admirably fulfills its stated purpose to present, in pictures, basic knowledge which will lead to early diagnosis and treatment of diseases which occur in the oral cavity.

The chapters cover (1) a brief presentation of histology and embryology as they relate to selected normal tissues; (2) developmental disturbances; (3) diseases of teeth and supporting structures; (4) diseases of the oral mucosa and jaws; and (5) neoplasms. The bibliography cites numerous selected references for detailed study of the various oral diseases. There is an excellent topic index.

To accomplish his purposes, the author has used 461 superb illustrations, all of which are in color except for the roentgenograms. The

color plates include reproductions of transparencies, sketches, and lithographs. Such profuse visual information provides precisely the aid needed by the clinician or student for swift diagnosis and proper treatment planning of all the oral diseases.

This book emphasizes the visual portrayal of clinical, roentgenographic, and microscopic appearances of the various oral diseases. Written material is brief and is confined to the page on which the entity is illustrated. The condensed information includes a concise definition of the condition illustrated and a short discussion of the pertinent local and general aspects.

The author is to be complimented highly for producing a compact book which has both reader interest and scientific merit. This atlas provides quick and authoritative information in a practical handbook so valuable it deserves a place in every dental library.

—KENNETH R. ELWELL, Col., USAF (DC)

THE YEAR BOOK OF NEUROLOGY, PSYCHIATRY AND NEUROSURGERY (1955-1956 Year Book Series). Neurology, edited by Roland P. Mackay, M. D. Psychiatry, edited by S. Bernard Wortis, M. D. Neurosurgery, edited by Percival Bailey, M. D., and Oscar Sugar, M. D. 576 pages; illustrated. The Year Book Publishers, Inc., Chicago, Ill., 1956. Price \$7.

This annual abstract of the current literature continues to be an important contribution as a time-saver to the student, the busy practitioner, and the specialist. It is gratifying that the recent literature reflects a more balanced and integrated approach to both neurophysiology and psychic functioning.

In the field of neurology, the editor feels that the development of an effective vaccine against acute anterior poliomyelitis was the outstanding event of 1955. There has been continued intensive work on the functions of the temporal lobe and the role played by the "visceral brain" in the behavior of the organism. That the temporal lobes are not the "seat of emotion" is apparent from investigations on the cingulate gyrus, the thalamus, the hypothalamus, and other areas. Encouraging progress is evident in the field of degenerative diseases, some of which, like progressive lenticular degeneration, may prove to be of metabolic origin and perhaps eventually amenable to therapy. Studies of the convulsive disorders reveal that electroencephalographic patterns are not readily translatable into clinical terms.

In the section on psychiatry, the year will be remembered as one of experimentation and clinical use of several new drugs. However, a difficult problem is a need for clearer criteria in the choice of drugs. One can predict with some assurance that newer and better anxiety- and tension-relieving drugs will soon become available and that fewer lobotomies will be done. Newer electric and ultrasonic devices will be more effective in the treatment of the mentally ill patient. However, much handicap is imposed on psychiatry and mental health programs by the deplorable lack of personnel and facilities. Hospital architecture

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THE YEAR BOOK OF NEUROLOGY, PSYCHIATRY AND NEUROSURGERY (1955-1956 Year Book Series). Neurology, edited by Roland P. Mackay, M. D. Psychiatry, edited by S. Bernard Wortis, M. D. Neurosurgery, edited by Percival Bailey, M. D., and Oscar Sugar, M. D. 576 pages; illustrated. The Year Book Publishers, Inc., Chicago, Ill., 1956. Price \$7.

This annual abstract of the current literature continues to be an important contribution as a time-saver to the student, the busy practitioner, and the specialist. It is gratifying that the recent literature reflects a more balanced and integrated approach to both neurophysiologic and psychic functioning.

In the field of neurology, the editor feels that the development of an effective vaccine against acute anterior poliomyelitis was the outstanding event of 1955. There has been continued intensive work on the functions of the temporal lobe and the role played by the "visceral brain" in the behavior of the organism. That the temporal lobes are not the "seat of emotion" is apparent from investigations on the cingulate gyrus, the thalamus, the hypothalamus, and other areas. Encouraging progress is evident in the field of degenerative diseases, some of which, like progressive lenticular degeneration, may prove to be of metabolic origin and perhaps eventually amenable to therapy. Studies of the convulsive disorders reveal that electroencephalographic patterns are not readily translatable into clinical terms.

In the section on psychiatry, the year will be remembered as one of experimentation and clinical use of several new drugs. However, a difficult problem is a need for clearer criteria in the choice of drugs. One can predict with some assurance that newer and better anxiety- and tension-relieving drugs will soon become available and that fewer lobotomies will be done. Newer electric and ultrasonic devices will be more effective in the treatment of the mentally ill patient. However, much handicap is imposed on psychiatry and mental health programs by the deplorable lack of personnel and facilities. Hospital architecture.



and our clinical practices will soon be modified by new and important advances.

In the neurosurgical section, it is noteworthy that indiscriminate "psychosurgery" is justly deprecated. There is considerable improvement in the technic of angiography and ventriculography with the real possibility of lessening the morbidity in these procedures. Stereotaxic investigations continue, and there now exists the possibility of destruction of the hypophysis. There is no effective pituitary hormone for replacement of an absent hypophysis, although a combination of cortisone, testosterone, and thyroid extract seems to act fairly well.

The yearbook continues to fulfill its mission, and the usual high standards of reporting have been maintained in the current volume.

—RICHARD R. CAMERON, Col., MC, USA

**BING'S LOCAL DIAGNOSIS IN NEUROLOGICAL DISEASES**, by Webb Haymaker, M. D. With Chapters by Richard G. Berry, M. D., Bernard S. Epstein, M. D., and Paul I. Yakovlev, M. D. Translated, Revised, and Enlarged from the Fourteenth German Edition, 478 pages; 225 illustrations, including 9 in color. The C. V. Mosby Co., St. Louis, Mo., 1956. Price \$16.75.

This volume is a completely revised and enlarged edition of a venerable neurologic classic; the present edition is virtually a new book due to an exhaustive revision in the light of the latest information.

The popularity of the method of presentation of this 478-page work is illustrated by the fact that Bing's first volume on local neurologic diagnosis was published in 1911 and has survived many editions, both in English and the original German.

The present edition covers in detailed fashion the localization of lesions of all parts of the central nervous system. A very large bibliography is included, and there are 225 well-selected photographs and diagrams. Brief sections on roentgenography and electrical methods of diagnosis are presented, apparently only to indicate the value of these methods, since this material is very sketchy and incomplete.

The sections on localization of lesions of the brain stem and cranial nerves and the detailed consideration of the many arterial occlusive syndromes are considered especially praiseworthy. The information is presented in rather dogmatic fashion, and there are those who will disagree with some of the conclusions reached. However, such material can hardly be useful if presented in an argumentative fashion, and the opinions are based upon the most generally accepted knowledge.

The main value of this book is to serve as a reference for making anatomic diagnoses in neurologic cases, and to give meaning to the many neurologic signs and symptoms encountered in clinical work. The practicing neurologist or neurosurgeon will probably keep it on his desk. It will also be extremely useful for any neurologically minded medical scholar who wishes to locate central nervous system lesions.

—ARTHUR L. SCHULTZ, Capt., MC, USN

## New Books Received

Books received by the *U. S. Armed Forces Medical Journal* are acknowledged in this department. Those of greatest interest will be selected for review in a later issue.

- TEXTBOOK OF BIOPHYSICAL CHEMISTRY**, by *Edward Staunton West*, Ph. O. 2d edition. 399 pages; illustrated. The Macmillan Co., New York, N. Y., 1956.
- AN ATLAS OF ANATOMY**, by *J. C. Boileau Grant*, M. C., M. B., Ch. B., F. R. C. S. (Edin.). 4th edition, 8½ by 11 inches in size. 556 pages; 714 figures, in color, arranged in the regional manner. The Williams & Wilkins Co., Baltimore, Md., 1956. Price \$15.
- REHABILITATION TRENDS—MID CENTURY TO 1956**. 96 pages; illustrated. *Institute for the Crippled and Disabled*, New York 10, N. Y., 1956. Price, 1-10 copies, \$2.00 each; 11 or more copies, \$1.85 each, plus a mailing and handling charge of 20 cents per copy, within the continental limits of the U. S. A.
- Williams OBSTETRICS**, by *Niebolson J. Eastman*. 11th edition, 1,212 pages; illustrated. Appleton-Century-Crofts, Inc., New York, N. Y., 1956.
- NERVE IMPULSE**, Transactions of the Fifth Conference, September 20, 21, and 22, 1954, Princeton, N. J., edited by *David Nachmansohn*, M. O., and *H. Houston Merritt*, M. D. 256 pages; illustrated. Josiah Macy, Jr. Foundation, New York, 1956. Price \$4.50.
- PSYCHOLOGY, PSYCHIATRY and the PUBLIC INTEREST**, edited by *Maurice H. Kroul*, Ph. O. 217 pages. University of Minnesota Press, Minneapolis, Minn., 1956. Price \$4.
- ATHLETIC INJURIES**, Prevention, Diagnosis and Treatment, by *Augustus Thordike*, M. D. 4th edition. 252 pages; 113 illustrations. Lea & Febiger, Philadelphia, Pa., 1956. Price \$4.50.
- A Manual of the COMMON CONTAGIOUS DISEASES**, by *Philip Moen Stirrison*, M. D., and *Horace Louis Hodes*, M. D. 5th edition. 624 pages; 84 illustrations and 10 plates, 8 in color; 16 tables. Lea & Febiger, Philadelphia, Pa., 1956. Price \$8.50.
- ENVIRONMENT AND THE DEAF CHILD**, by *Steven Getz*, Ph. D. 173 pages. Charles C Thomas, Publisher, Springfield, Ill., 1956. Price \$3.75.
- GROUP PROCESSES**, Transactions of the Second Conference, October 9, 10, 11, and 12, 1955, Princeton, N. J., edited by *Bertram Schaffner*, M. D. 255 pages; illustrated. Josiah Macy, Jr. Foundation, New York, N. Y., 1956. Price \$3.50.
- BASIC READINGS ON THE MMPI IN PSYCHOLOGY AND MEDICINE**, edited by *George Schlager Welsh* and *W. Grant Dahlstrom*. 656 pages. University of Minnesota Press, Minneapolis, Minn., 1956. Price \$8.75.
- FUNDAMENTALS OF CHEMISTRY AND APPLICATIONS**, by *Charlotte A. Francis*, A. M., and *Edna C. Morse*, R. N., A. M., Ed. D. 4th edition. 543 pages; illustrated. The Macmillan Co., New York, N. Y., 1956.

- PSYCHIATRIC RESEARCH REPORTS 5**, of the American Psychiatric Association. "Research Techniques in Schizophrenia." Edited by Members of the Committee on Research, 1955-1956. Jacques S. Gottlieb, M. D., Chairman. Papers presented at the APA Mid-Atlantic Regional Research Conference, Georgetown University School of Medicine, Department of Psychiatry, Washington, D. C., March 9-10, 1956. 153 pages; illustrated. Published by American Psychiatric Association, Washington 6, D. C., June 1956. Price \$2.
- THE PRACTICE OF MEDICINE**, edited by Jonathan Campbell Meakins, C. B. E., M. D., LL. D., D. Sc. 6th edition. 1,916 pages; 318 illustrations, including 4 in color. The C. V. Mosby Co., St. Louis, Mo., 1956. Price \$16.
- THE MEDICAL CLINICS OF NORTH AMERICA**, Symposium of Specific Methods of Treatment. Consulting Editor, Michael G. Wohl, M. D. Pages 1259 to 1572; illustrated. W. B. Saunders Co., Philadelphia, Pa., 1956. Price \$4.
- ETIOLOGIC FACTORS IN RENAL LITHIASIS**, compiled and edited by Arthur J. Butt, B. S., M. D., F. A. C. S. 400 pages; illustrated. Charles C Thomas, Publisher, Springfield, IL, 1956. Price \$12.50.
- CLINICAL ENDODONTICS**, A Manual of Scientific Endodontics, by Ralph Frederick Sommer, D. D. S., M. S., F. A. C. D., F. A. A. O. R.; F. Earl Ostrander, A. B., D. D. S., M. S., F. A. C. D.; and Mary C. Crouley, A. B., M. S. P. H. 514 pages; illustrated. W. B. Saunders Co., Philadelphia, Pa., 1956.
- CLINICAL OPERATIVE DENTISTRY**, edited by William John Simon. 381 pages; 650 illustrations on 538 figures. W. B. Saunders Co., Philadelphia, Pa., 1956.
- THE INITIAL MANAGEMENT OF THORACIC AND THORACO-ABDOMINAL TRAUMA**, by Lawrence M. Sbefts, M. D. American Lecture Series, Publication No. 265, A Monograph in The Baerstone Division of American Lectures in Surgery, edited by Michael E. DeBakey, M. D., and R. Glen Spurling, M. D. Thoracic Surgery Division, Editor: Brian B. Blades, M. D. 121 pages; illustrated. Charles C Thomas, Publisher, Springfield, Ill., 1956. Price \$6.50.
- DICTIONARY OF POISONS**, by Ibert Mellan and Eleanor Mellan. 150 pages. Philosophical Library, Inc., New York, N. Y., 1956. Price \$4.75.
- ANNALS OF THE NEW YORK ACADEMY OF SCIENCES**, Volume 64, Art. 2, pages 25-277, July 3, 1956. Editor-in-Chief, Kenneth T. Morse. "Some Protozoan Diseases of Man and Animals: Anaplasmosis, Babesiosis, and Toxoplasmosis." 252 pages; illustrated. The New York Academy of Sciences, New York, N. Y., 1956. Price \$3.50.
- ANNALS OF THE NEW YORK ACADEMY OF SCIENCES**, Volume 64, Art. 3, pages 279-462, August 17, 1956. Editor-in-Chief, Kenneth T. Morse. "Calcium and Phosphorus Metabolism in Man and Animals with Special Reference to Pregnancy and Lactation." 183 pages; illustrated. The New York Academy of Sciences, New York, N. Y., 1956. Price \$4.
- ANNALS OF THE NEW YORK ACADEMY OF SCIENCES**, Volume 65, Art. 1, pages 1-32, June 18, 1956. Editor-in-Chief, Kenneth T. Morse. "Effects of Natural Selection on Human Genotypes." 32 pages. The New York Academy of Sciences, New York, N. Y., 1956. Price \$1.25.
- ANNALS OF THE NEW YORK ACADEMY OF SCIENCES**, Volume 65, Art. 2, pages 33-54, June 21, 1956. Editor-in-Chief, Kenneth T. Morse. "On the Cell Model For Solutions," by Stuart A. Rice. 20 pages. The New York Academy of Sciences, New York, N. Y., 1956. Price \$1.25.

# UNITED STATES ARMED FORCES MEDICAL JOURNAL

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*Editor*

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*Associate Editors*

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## Monthly Message

This is a translation of an early Hindu medical oath of unknown origin:

YOU MUST BE CHASTE AND ABSTEMIOUS . SPEAK THE TRUTH , NOT EAT MEAT .. CARE FOR THE GOOD OF ALL LIVING BEINGS . DEVOTE YOURSELF TO THE HEALING OF THE SICK EVEN IF YOUR LIFE BE LOST BY YOUR WORK . DO THE SICK NO HARM , NOT , EVEN IN THOUGHT . SEEK ANOTHER'S WIFE OR GOODS , BE SIMPLY CLOTHED AND DRINK NO INTOXICANT . SPEAK CLEARLY , GENTLY , TRULY , PROPERLY . CONSIDER TIME AND PLACE . ALWAYS SEEK TO GROW IN KNOWLEDGE .. DO NOT TREAT WOMEN EXCEPT THEIR MEN BE PRESENT . NEVER TAKE A PRESENT FROM A WOMAN WITHOUT HER HUSBAND'S CONSENT . . WHEN THE PHYSICIAN ENTERS A HOUSE ACCOMPANIED BY A MAN SUITABLE TO INTRODUCE HIM THERE , HE MUST PAY ATTENTION TO ALL THE RULES OF BEHAVIOR IN DRESS , DEPORTMENT , AND ATTITUDE .. ONCE WITH HIS PATIENT , HE MUST IN WORD AND THOUGHT ATTEND TO NOTHING BUT HIS PATIENTS CASE AND WHAT CONCERNS IT .. WHAT HAPPENS IN THE HOUSE MUST NOT BE MENTIONED OUTSIDE , NOR MUST HE SPEAK OF POSSIBLE DEATH TO HIS PATIENT , IF SUCH SPEECH IS LIABLE TO INJURE HIM OR ANYONE ELSE ... IN FACE OF GODS AND MAN . YOU CAN TAKE UPON YOURSELF THESE VOTS . MAY ALL THE GODS AID YOU IF YOU ABIDE THEREBY . OTHERWISE MAY ALL THE GODS AND THE SACRA . BEFORE WHICH WE STAND . BE AGAINST YOU . AND THE PUPIL SHALL CONSENT TO THIS . SAYING . SO BE IT

*Frank B. Berry*

FRANK B. BERRY, M. D.  
Assistant Secretary of Defense  
(Health and Medical)

Quoted from *The Peaks of Medical History*, by Charles L. Oana, Paul B. Hoeber, Inc., New York.

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## Foreword

The *United States Armed Forces Medical Journal* is the medium for disseminating information of administrative and professional interest to all medical personnel of the Department of Defense. The Assistant Secretary of Defense (Health and Medical) and the Surgeons General of the several services invite all medical officers, dental officers, Medical Service Corps officers, Nurse Corps officers, and officers of the Veterinary Corps of the Armed Forces, and the medical consultants of the Army, Navy, and Air Force to submit manuscripts for publication in this journal.

FRANK B. BERRY, M. D.,  
*Assistant Secretary of Defense (Health and Medical).*

MAJOR GENERAL SILAS B. HAYS,  
*Surgeon General, United States Army.*

REAR ADMIRAL BARTHOLOMEW W. HOGAN,  
*Surgeon General, United States Navy.*

MAJOR GENERAL DAN C. OGLE,  
*Surgeon General, United States Air Force.*

# UNITED STATES ARMED FORCES MEDICAL JOURNAL

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## ACUTE RESPIRATORY ILLNESS CAUSED BY ADENOVIRUSES

### A Military Problem

MAURICE R. HILLEMAN, *Ph. D.*

**T**HE ACUTE respiratory illnesses of man present a major medical problem to the armed services in time of peace and more prominently in time of war. The magnitude of the problem in the U. S. Army during the last World War is illustrated in the example cited by Duff:

During the period of World War II, 1942-1945, from a mean strength of 6,076,135 there were 4,086,562 admissions for common respiratory disease recorded by the United States Army. The average time lost from duty by a person admitted for treatment of common respiratory disease during this period was 6.5 days . . . . The 4,086,562 cases admitted during the war period thus resulted in approximately 26.5 million man-days lost from duty, or approximately 18,000 each day of the war. An Army division is composed of 15,000 personnel. Thus, more than equivalent strength of one Army division were absent from duty every day of the war because of the common respiratory diseases.<sup>1</sup>

During World War II, the members of the Commission on Acute Respiratory Diseases conducted extensive investigations of the respiratory illnesses of soldiers in an effort to delineate the clinical syndromes and to elucidate the causes wherever possible.

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Certain portions of this paper were presented before the Military Preventive Medicine Section at the 105th Annual Meeting of the American Medical Association, Chicago, Ill., on 14 June 1956.

From Walter Reed Army Institute of Research, Washington, D. C.



These workers<sup>2-4</sup> observed that, aside from respiratory illnesses caused by bacteria or known viruses or from the common cold, there remained a large bulk of acute respiratory illnesses of unknown causation. These belonged in the general category of "febrile catarrhs" differentiated from influenza by Stuart-Harris, Andrewes, and Smith<sup>5</sup> in 1938. The members of the Commission recognized at least three distinct clinical entities among the cases of "febrile catarrh" which they referred to as undifferentiated acute respiratory disease (ARD), nonstreptococcal exudative pharyngitis, and primary atypical pneumonia (PAP). They demonstrated the separate causes of ARD, PAP (associated with the development of cold agglutinins), and the common cold based on the results of transmission experiments<sup>6,7</sup> in human volunteers by employing filtered throat washings from patients. In further epidemiological studies, it was shown<sup>8,9,10</sup> that epidemics of ARD occurred in recruits but not in "seasoned" men and that immunity seemed to follow this infection.

### CAUSES

During and following World War II, numerous attempts were made to recover the virus of ARD in experimental laboratory hosts but none was successful. During 1953, human cell tissue culture was first applied to the problem, and this resulted in the independent discovery by Rowe and associates<sup>7</sup> and by Hilleman and Werner<sup>10</sup> of a new family of viruses which inhabit the respiratory tract of man. The viruses (adenoid degenerative or AD) of Rowe and co-workers<sup>7</sup> were recovered as "masked" agents from surgically removed human adenoidal tissue being cultivated in tissue culture. The respiratory infection agents (RI) discovered by Hilleman and associates,<sup>10,11</sup> which included types now designated 3, 4, and 7, were recovered from throat washings of military patients with ARD or PAP in an epidemic. The prototype strain RI-67, as well as other viruses recovered in the epidemic, were shown by serologic methods to be related causatively to the disease in the recruits. Following this, Dingle and associates<sup>12,13</sup> showed by retrospective serodiagnosis that the RI-67 virus was related to cases of ARD which occurred among soldiers during World War II.

The new family of respiratory viruses has been designated by several names in the past. Huebner and associates<sup>14</sup> and Rowe and co-workers<sup>15</sup> have used the name adenoidal-pharyngeal-conjunctival (APC) viruses. Hilleman and associates<sup>10,11,16</sup> referred to these agents as the RI family of viruses and Ginsberg and co-workers<sup>17,18</sup> designated certain of the agents as ARD viruses. More recently a new name, Adenovirus,<sup>19</sup> was adopted by the principals working in this field, and it was agreed that the previous designations of RI, APC, and ARD be no longer used.

Huebner and associates<sup>14</sup> and others<sup>11, 22, 19-21</sup> have shown that there are at least 14 distinct serotypes among the agents of the Adenovirus family. These serotypes are readily distinguished by the serum neutralization technic employing monotypic rabbit antisera. On the other hand, all the types of virus elaborate a common group-specific "soluble" complement-fixing antigen<sup>10, 24, 18, 22, 23</sup> which can be separated readily from the virus by filtration or centrifugation procedures. Morphologically, the type 4 RI-87 and type 2 AD-6 strains have been shown to resemble influenza virus and to consist of spherical elementary bodies around 100 m $\mu$  in diameter.<sup>22</sup> The CF antigen is of smaller size.

### CLINICAL FINDINGS

The clinical findings in patients with acute respiratory illness caused by the Adenoviruses indicate that all segments of the respiratory tract may be affected, the symptoms and signs in any particular patient depending upon the degree of damage and the location of the areas involved. In a recent study by Dascomb and Hilleman<sup>14</sup> of 45 proved cases of acute respiratory illness caused by the Adenoviruses (predominantly or entirely type 7 virus) in newly recruited soldiers, it was observed that the most prominent clinical features were fever, pharyngitis, and severe cough. These were accompanied by constitutional symptoms such as headache, malaise, chills, myalgia, and dizziness which were usually mild. About half the patients developed discrete or confluent patches of nonbacterial white exudate on the hyperplastic lymphatic tissue in their throats, and the majority exhibited a coryzal feature. Laryngitis with hoarseness was a common complaint. Bilateral conjunctivitis and lymphadenopathy of the head and neck region were commonly observed among the patients studied. Lower respiratory tract involvement consisting of tracheobronchitis and bronchiolitis was a frequent finding, and about 16 per cent presented roentgenographic evidence of pneumonitis. The mean maximum temperature in the patients was about 103°F, and the fever lasted approximately 6 days on the average. The average hospital stay was around 10 days.

These disease conditions are commonly referred to as grippe, catarrhal fever, virus pneumonia, acute pharyngitis, or severe colds. More specifically, they belong in four respiratory disease entities established by the Commission on Acute Respiratory Diseases<sup>2-4</sup> during World War II [*viz.*, undifferentiated acute respiratory disease (ARD), nonstreptococcal exudative pharyngitis, bronchitis resembling atypical pneumonia (Br-AP), and primary atypical pneumonia (PAP) (unassociated with the development of cold agglutinins)] and the syndrome of pharyngoconjunctival fever described more recently by Parrott and co-workers<sup>24</sup> and by Bell and others.<sup>25</sup> Collectively, these entities belong in the syndrome of febrile catarrh established in 1938 by Stuart-Harris, Andrewes,

and Smith to distinguish an illness having catarrhal aspects but otherwise resembling influenza. Kjellen<sup>16</sup> in Sweden has shown that viruses of the Adenovirus family may be involved also in certain cases of mesenteric lymphadenitis, and Jawetz and associates<sup>10</sup> have presented evidence implicating the Adenoviruses in patients with keratoconjunctivitis. The Adenoviruses do not appear to be associated with the ordinary common cold in which there is a watery discharge with little or no fever,<sup>10,13,16,17</sup> with primary atypical pneumonia in which the test for cold or Streptococcus MG agglutinin becomes positive,<sup>10,13,16,17,22,27</sup> with psittacosis or ornithosis, with Q fever, or with influenza A, B, and C.

There is no specific therapeutic treatment for Adenovirus infections.<sup>16</sup> The therapy of the disease is symptomatic and may include steam inhalation, codeine, aspirin, bed rest, and adequate fluid intake.

### LABORATORY DIAGNOSIS

Reliable laboratory test procedures have been developed for diagnosis of infection with the Adenoviruses.<sup>10,13,21</sup> These involve either (a) the demonstration of a significant increase in amount of complement-fixing (CF) or neutralizing antibody against the virus in the patient's serum during the progress of the disease or (b) the recovery and identification of the causative agent. Antigen employed for performance of the CF test is prepared from tissue cultures infected with an Adenovirus, usually RI-67.<sup>10,21</sup> The "soluble" antigen active in such material is sufficiently group-specific so that antigen prepared from a single type will suffice to detect infection with any of the known types.<sup>11,13,21</sup> The demonstration of a fourfold or greater increase in CF antibody in the patient's serum during convalescence (two weeks after onset) as compared with the acute phase specimen is considered to be of diagnostic significance. For serodiagnosis by the neutralization procedure, the titer of viral "inactivating" antibody in the acute and convalescent (three weeks after onset) serum samples is determined in tissue cultures. As in the CF test, a fourfold or greater increase in antibody level is diagnostic, but a "battery" of different serotypes must be employed because the serologic response in most patients usually is markedly type-specific against the homologous infecting strain.

At the present time, types 3, 4, and 7 virus appear to suffice for diagnosis of the military cases.<sup>11,21</sup> The majority of the cases reported in civilian groups are type 3.<sup>17,24,25</sup> For virus recovery attempts, the patient's throat washings are inoculated into appropriate human cell tissue cultures and the recovered agents are identified in neutralization or CF tests with known positive anti-

sera. Virus usually can be isolated from 25 to 50 per cent of all patients who have Adenovirus illness proved by serologic procedures. The virus recovery and serum neutralization tests, which must be carried out in tissue culture, are necessarily laborious and expensive and are therefore limited to research laboratories. The relatively simple *in vitro* CF test, on the other hand, is best suited for routine diagnosis where the identification of the particular infecting type is unnecessary.

### EPIDEMIOLOGY

Respiratory illness caused by the Adenoviruses is widespread in military populations, primarily among newly inducted soldiers.<sup>10, 11, 12, 17, 21, 22, 27, 28</sup> The illness is far less common among "seasoned" troops than in recruits.<sup>21, 22</sup> The disease occurs in epidemic form throughout the year but is most prevalent during the winter months, when it may account for as many as 9 of every 10 hospitalizations for respiratory illness in recruit training camps.<sup>21, 27, 28</sup> This occurrence in all seasons is in striking contrast to that of influenza, which is epidemic only during the winter and is seldom encountered during other times of the year. The year-round prevalence of Adenovirus infections indicates that the virus resides continuously in the human population and that at least one means for perpetuating the disease is by contact with patients. The epidemic pattern<sup>29</sup> of outbreaks of Adenovirus respiratory disease in individual companies of soldiers during a period of high prevalence in the camp is, like that of influenza, explosive in nature, having reached the peak by the third week after the men were inducted into the Army. The over-all occurrence of the disease on the post, however, appears as a continuous curve which is a summation of the series of outbreaks in the individual training companies.

The importance of respiratory illness caused by the Adenoviruses to the armed services is reflected in the high proportion of soldiers who develop the clinical disease during their basic training period. The findings of a recent study<sup>29</sup> of the incidence of Adenovirus infections among recruits made at Fort Dix, N. J., indicate that approximately 80 per cent of the recruits who took their basic training at this post during the winter of 1954 acquired Adenovirus infection during their first 8 weeks in the Army and only 20 per cent escaped without infection. The Adenovirus infections acquired during this period were almost equally divided between recruits who manifested clinical respiratory disease and those who had inapparent infections or illness so mild that the soldier did not seek medical care. Among those who became sick, roughly half had an illness severe enough to require hospitalization while that of the remaining individuals was relatively mild and was treated on an outpatient basis at the dispensary. Similar studies of recruits who received their basic training

in the summer showed that a much smaller percentage acquired Adenovirus infections and only 10 per cent became infected. The relative proportion of patients who were hospitalized with mild or inapparent cases, however, remained roughly the same as during the winter months.

Further investigations by our group to determine the economic importance of Adenovirus respiratory disease in military personnel were conducted by laboratory study of a representative sample of patients with acute respiratory illness hospitalized at Fort Dix, N. J., during the period from June 1954 through May 1955. During this time, approximately 15,000 admissions were recorded, of which about 10,000 were for respiratory disease. Based on the laboratory test results, about 60 per cent of the recruit respiratory disease, or an estimated 6,000 cases, were caused by the Adenoviruses. The hospital stay for such patients may average around 10 days,<sup>14,17</sup> thus resulting in about 60,000 days of hospital care and man-days lost. It has been estimated<sup>18</sup> that the average cost per day for medical care in a station hospital such as Fort Dix is \$20.31 and the daily cost per man-day in the service during the first 25 weeks in the Army is \$14.65 (excluding the allowance for medical care). Based on these figures, the total cost of Adenovirus disease among the recruits in this single recruit training base at Fort Dix may be estimated to approximate \$2,000,000 per year. Added to this are the costs for repeat training and such less tangible factors as the burdens imposed by disruption of the troop training program.

Even though the viruses of the Adenovirus family comprise at least 14 distinct immunological types, only 3 of these, types 3, 4, and 7, have been found important in military populations.<sup>14,21</sup> Among the cases, roughly 40 per cent appear to be caused by type 4, 40 per cent by type 7, and only 20 per cent by type 3 virus. Those findings are in marked variance with those found in civilian populations, in which type 3 has been predominant and types 4 and 7 only rarely encountered.<sup>17,24,25</sup> The reason for this difference between military and civilian groups is not known.

### PREVENTION

The economic importance of acute respiratory illness caused by the Adenoviruses to the military in time of peace and its more serious consequences during periods of mobilization for war make it expedient that some method be developed for its prevention. Studies to develop an effective Adenovirus vaccine have been in progress in several laboratories. Huebner and associates<sup>21</sup> have reported that volunteers injected with a heat- or formalin-treated preparation of type 3 virus grown in tissue culture developed neutralizing antibody against the agent. Further, this vaccine afforded significant protection against the experimental

disease which resulted from challenge with type 3 virus onto the conjunctivae of the volunteers.

Recently, our laboratory at the Walter Reed Army Institute of Research recorded the development, preparation, and field evaluation of a formalin-killed Adenovirus vaccine prepared from monkey kidney tissue culture.<sup>22</sup> This vaccine contained the two Adenoviruses, types 4 and 7, found predominantly in the military setting. It proved highly effective in the prevention in recruits of acute respiratory illnesses caused by the Adenoviruses.

The field evaluation of the vaccine was made at Fort Dix during the winter of 1955-1956, at a time when more than 90 per cent of all cases of respiratory illness in hospitalized recruits were caused by the Adenoviruses and when the predominant virus types were 4 and 7. The findings (fig. 1) showed, as might be

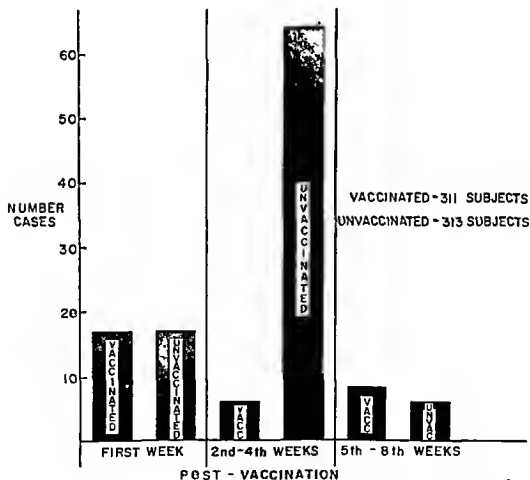


Figure 1. Relation of hospitalizations for acute respiratory illness to time of vaccination.

expected, that the vaccine did not prevent illness during the first week after vaccination. However, during the second, third, and

fourth weeks following vaccination, the incidence of respiratory illness in the vaccinated group was only one eleventh of that in the nonvaccinated controls. After the fourth week, the incidence fell to low levels, and no significant difference was found in the incidence in the vaccinated and control groups. By giving the vaccine as soon as possible after recruits are inducted into the Army, it should be possible to prevent most of the respiratory disease caused by the Adenoviruses which, as previously noted, occurs during the first four weeks of basic training." It should be noted further that most of the cases of acute respiratory disease which occurred among the vaccinated persons were not caused by the Adenoviruses. More recently (unpublished) it was shown that the vaccine effected a 98 per cent reduction in cases caused by Adenovirus specifically.

### REMARKS

The discovery of the Adenoviruses (RI-APC-ARD agents) has taken a good-sized bite from the "respiratory pie," and the development of the effective vaccine shows promise of eliminating acute respiratory illness caused by the Adenoviruses as an important problem in military medicine. It should be pointed out, however, that there still remains a large bulk of acute respiratory illnesses of man of unknown cause. The continued application of human cell tissue culture to this problem should lead to the elucidation of the causes and eventual control of other respiratory diseases, the causation of which is presently unknown.

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# TOXIC EFFECTS OF CHLORPROMAZINE

## Hepatitis and Agranulocytosis

WALLIS L. CRADDOCK, *Lieutenant Colonel, MC, USAF*

**I**N ADDITION to the milder side effects of chlorpromazine (Thorazine, Largactil), serious reactions may occur. Because of the hazards involved and the seriousness of the hepatitis and agranulocytosis that may result, it is essential that the present status of these events be reviewed.

### CHLORPROMAZINE JAUNDICE

Enough well-documented cases of intrahepatic cholestatic jaundice from chlorpromazine have now been recorded to establish definite conclusions regarding the association of obstructive jaundice and the drug. A summary of earlier reports (through 1955) supported by liver biopsy and liver function studies appears in table 1. These cases illustrate the varied aspects of the problem. Of course, many more reports of probable chlorpromazine-induced jaundice have been published, but most of these have not been satisfactorily studied to rule out the possibility of concurrent exposure to other hepatotoxic or icterogenic agents or conditions. Laparotomy was performed in the earlier reported cases when the relationship of the drug to the jaundice was not clearly understood. The differential diagnosis is no longer as difficult, since the characteristic histopathologic features in this type of jaundice are now established and eosinophilia is often a companion finding. The lesion resulting from chlorpromazine administration is unlike that encountered in the livers of patients developing jaundice from external biliary obstruction. Evidence of stasis of bile is invariably found in the central portions of the hepatic lobules, whereas in jaundice resulting from external biliary obstruction, plugs of bile pigment may be found in any portion of the lobule, including the periphery.<sup>1</sup>

Determination of the serum aminopherase (transaminase) activity gives an index of liver cell injury, aids in ruling out the

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From Veterans Administration Hospital, Ft. Douglas, Utah. Col. Craddock is associated with 328th General Hospital, Ft. Douglas, Utah.

presence of viral hepatitis, and indicates impending liver failure. The fact that increased transaminase activity has been found to precede the development of jaundice resulting from chlorpromazine suggests that the transaminase test may be used as a tool to anticipate, and thereby prevent, toxic hepatitis in patients who receive this potentially hepatotoxic drug.<sup>2</sup> This test appears to reflect the degree of hepatocellular damage more closely than the flocculation tests, serum cholinesterase and alkaline phosphatase activities, and other tests of liver dysfunction.

Although many chemicals are known to produce hepatic necrosis, the changes in the liver resulting from chlorpromazine administration simulate those seen in hepatitis induced by methyltestosterone and arsenamine, with little or no evidence of hepatic cellular damage. Unlike other toxic injuries of the liver due to infectious agents (including viral hepatitis), halogenated hydrocarbons, and arsenic, hepatic injury resulting from chlorpromazine is usually mild, with minimal cellular degeneration and necrosis of individual central cells. There appears to be primary injury of the small biliary passages which become plugged with bile ("thrombi") and surrounded by an inflammatory exudate of polymorphonuclear leukocytes, eosinophils, and lymphocytes in the portal area.

It is interesting that the jaundice may occur several weeks after withdrawal of the drug,<sup>3</sup> and icterus has lasted for seven weeks after only 50 mg of chlorpromazine was given.<sup>4</sup> In cases of obstructive jaundice in which careful questioning of a patient discloses recent intake of even small amounts of chlorpromazine, operation should be deferred until a complete investigation is made to rule out the possibility of chlorpromazine-induced icterus. When cholelithiasis and cholecystitis are recorded in the history, it would be well to avoid the use of chlorpromazine because of the possible diagnostic confusion that may ensue in the hypersensitive patient. Although the jaundice may persist for over six months after drug withdrawal,<sup>5</sup> there appears to be no residual hepatocellular damage, but further study may alter this view. Several clinicians believe that there may be a greater susceptibility to jaundice in patients with histories of liver disorders. In some cases the drug has been restarted without recurrence of the jaundice, but it is inadvisable to again give the drug. Sparine (brand of promazine) can be given if a patient has previously been sensitive to chlorpromazine, as jaundice attributable to the administration of this newer phenothiazine compound has not been seen.

Although the seat of the reaction appears to be in the portal area, experimental evidence strongly suggests that the drug produces stasis in the biliary tree due to an increase in the resistance of the choledochoduodenal sphincter,<sup>6</sup> thus depressing

TABLE 1. Summary of reports of chlorpromazine jaundice supported by liver biopsy and liver function studies (1954-1955)

Author	Case no.	Chlorpromazine		Maximum serum			Eosinophils (per cent)	Weeks of icterus	Remarks
		Daily dosage (mg)	Duration of treatment (days)	Bilirubin (mg/100 ml)	Alkaline phosphatase (B. U.)	Cholesterol (mg/100 ml)			
Lemire & Mitchell <sup>11</sup>	1	200	23	(fct. ind., 106)	17.3	-	7	6	
	2	100	15	48.6	10.8	250	17	8	Laparotomy done in all 3 cases. All had severe pruritis but no chills, fever, vomiting, or malaise.
	3	50	31	8.1	36.0	584	Absent	6	
Boardman <sup>10</sup>	4	Up to 500	21	23.0	25.0	-	Absent		Death. Autopsy findings supported diagnosis of "toxic hepatitis."
Zatuchni & Miller <sup>10</sup>	5	75	14	13.7	10.0	461	Absent	4	Laparotomy.
Movitt, et al. <sup>12</sup>	6	100	28	21.0	13.0	325	Absent	3	Laparotomy.
	7	50	30	26.0	32.0	610	Absent	6	Needle biopsy. Transient splenomegaly present.
	8	125	22	6.7	20.0	304	Absent	2	Needle biopsy.

TABLE 1. Summary of reports of chlorpromazine jaundice supported by liver biopsy and liver function studies (1954-1955)—Continued

Author	Case no.	Chlorpromazine		Maximum serum				Eosinophilia (per cent)	Weeks of icterus	Remarks
		Daily dosage (mg)	Duration of treatment (days)	Bilirubin (mg/100 ml)	Alkaline phosphatase (B. U.)	Cholesterol (mg/100 ml)				
Sussman & Sumner <sup>4</sup>	9	50 (single dose)	-	14.0	9.0	-		Absent	7	Needle biopsy. Apparent acute hypersensitivity; 2 hours after repeat dose of 38 mg, severe systemic symptoms with recurrence of jaundice.
	10	75	21	18.8	16.6	276		42; 6 after 13 days	11	Needle biopsy; no response to ACTH therapy.
Gold, et al. <sup>9</sup>	11	75	21	10.0	24.0	539		16	3	Needle biopsy.
	12	75	14	10.3	22.0	353		5	3	Needle biopsy.
	13	75	25	*2.5	*51.0	*1768		Absent	6	*Tests not done until 3 weeks after onset of jaundice. Needle biopsy.
Hodges & LaZerte <sup>15</sup>	14	50	28	15.95	7.7	325		4	2	Death. Liver biopsy showed chlorpromazine hepatitis. Agranulocytosis also complicating feature. (See table 3)

TABLE 1. Summary of reports of chlorpromazine jaundice supported by liver biopsy and liver function studies (1954-1955)—Continued

Author	Case no.	Chlorpromazine		Maximum serum			Eosinophilis (per cent)	Weeks of icterus	Remarks
		Daily dosage (mg)	Duration of treatment (days)	Bilirubin (mg/100 ml)	Alkaline phosphatase (B. U.)	Cholesterol (mg/100 ml)			
Kelsey, et al.	15	400	21	4.2	14.0	-	Absent	8	Liver biopsy.
	16	200	14	5.4	17.6	-	Absent	2	Liver biopsy.
	17	30	12	5.0	17.8	-	Absent	7	Liver biopsy.
	18	Not stated		7.7	13.5	-	Absent	3	Laparotomy.
	19	40	20	11.4	9.3	269	Absent	3	Liver biopsy.
	20	800	30	7.0	42.0	-	Absent	6	Drug discontinued 10 days before jaundice. Liver biopsy. BUN 133 mg.%, became normal at 4 weeks. Abnormal serum protein, TT and CC flocc, persisted.
	21	40	5	11.9	19.4	-	Absent	11	Previous cholecystitis. Liver biopsy. Splenomegaly. Liver function remained abnormal (normal function day of starting chlorpromazine). BUN 45 mg.%, became normal at 2 weeks.

TABLE 1. Summary of reports of chlorpromazine jaundice supported by liver biopsy and liver function studies (1954-1955)—Continued

Author	Case no.	Chlorpromazine		Maximum serum			Eosino- philia (per cent)	Weeks of icterus	Remarks
		Daily dosage (mg)	Duration of treatment (days)	Bili- rubin (mg/100 ml)	Alkaline phosphatase (B. U.)	Choles- terol (mg/100 ml)			
McHardy, et al. <sup>21</sup>	22	40	17	6.5	19.1	-	7	3	Patient had an "allergic tendency" which may have indicated hypersensi- tivity. Laparotomy.
Redeker & Balfour <sup>22</sup>	23 24	100 150	4 5	- -	8.4 5.1	- -	Absent Absent	5 8	Liver biopsy. Onset of jaundice 1 week after drug stopped,
Stacey, et al. <sup>5</sup>	25	75	20	40.0	16.0	900 (xanthel- asma)	Absent	4	Death, Rupture of liver. Liver biopsy showed characteristic changes. (Pa- tient treated for postpartum psychosis.)
Asber & Corbett <sup>23</sup>	26	100	20	15.2	20.0	330	Absent	12	History of cholelithiasis. Chlorproma- zine given after cholecystectomy. Re-operated on to explore common duct--no stones. Liver biopsy at operation.

duodenal motility. That jaundice is apparently not the result of direct toxic action of chlorpromazine on the liver<sup>7</sup> is supported by the demonstrated lack of correlation between the amount of drug ingested and the occurrence of jaundice, the absence of liver damage in patients who have taken large amounts of the drug in suicidal attempts, the failure to induce liver damage in experimental animals, and the observation that in some patients jaundice is not apparent until some time after the drug is stopped.

The cause of the transient eosinophilia (as high as 42 per cent) is unknown. We have observed eosinophilia in several patients receiving chlorpromazine who did not develop jaundice, but one patient became jaundiced after eosinophilia had been present for about one week. Steroid or corticotropin (ACTH) therapy does not appear to affect the clinical course of chlorpromazine jaundice, in contrast to the prompt and striking response to intravenous ACTH therapy often demonstrated in cases of cholestasis of viral origin.<sup>8</sup> Concomitant administration of ether drugs such as large doses of estrogens and Atabrine (brand of quinacrine hydrochloride) might predispose to liver damage from chlorpromazine.

Jaundice occurs in about one per cent of patients treated with chlorpromazine in mental hospitals. Usually they are not very sick, and they experience less fatigue than patients suffering from other forms of hepatitis. Nevertheless, it must be emphasized that there have been several fatal cases of hepatitis implicating the drug. The jaundice may develop insidiously or there may be an abrupt onset of mild flulike symptoms with or without fever. A program of bed rest and special diet is unnecessary. Despite the hepatitis, electroconvulsive therapy has been given during the period of jaundice without any apparent ill effects. The liver is usually slightly enlarged but nontender. Transient splenomegaly has been reported. The results of the liver function tests are similar to those obtained in patients with obstructive jaundice, with significant elevation of serum alkaline phosphatase and transaminase activity and often high values of serum total cholesterol. The alkaline phosphatase may remain high after the serum bilirubin and cholesterol return to normal. A very high cholesterol level was reported in one case (1,768 mg per 100 ml); in this instance the hyperlipemia may have been due in part to the diabetes and renal disease that complicated the hepatitis.<sup>9</sup> However, the serum cholesterol returned to normal after the jaundice disappeared. There has been no evidence of disturbed porphyrin metabolism from chlorpromazine in the cases we have studied.

Another interesting observation is the elevation of blood urea nitrogen recorded in 8 of 12 cases reported by Kelsey and associates,<sup>10</sup> the levels ranging from 20 to 130 mg per 100 ml. In one

patient known to have azotemia at the time of drug administration, the blood urea nitrogen rose from 60 to 130 mg per 100 ml in a two-week period. During this time he developed jaundice. This suggests the possibility that impaired renal excretion of the drug might play some role as a cause of hepatic injury.

Because evidence of functional hepatic impairment in patients on chlorpromazine therapy has been demonstrated by liver tests in the absence of jaundice (in 50 per cent of the cases reported by Lehman and Hanrahan<sup>11</sup>), it may be wise to carry out such laboratory procedures in all patients receiving large doses of the drug over prolonged periods.<sup>12</sup> In one study<sup>3</sup> 100 patients treated with chlorpromazine were followed by serial determinations of the alkaline phosphatase activity. The drug was discontinued when the concentration exceeded normal. In this group only one patient developed jaundice.

A review of the cases of jaundice due to chlorpromazine reported in the literature through 1955 reveals the data to be rather inadequate for excluding the possibility of concurrent exposure of the patient to other hepatotoxic or icterogenic agents and conditions. Criticism pertains particularly to the cases in which no histopathologic studies were done. Five cases of chlorpromazine jaundice have been carefully studied at our hospital. The transaminase activity in all cases followed the pattern seen in extrahepatic obstructive jaundice. The electrophoretic pattern of the serum proteins was undisturbed. In one case jaundice did not appear until three weeks after the drug was stopped; a total dose of 1.1 grams of chlorpromazine had been given in a dosage of 0.25 gram daily.

The laboratory data in one of our cases are summarized in table 2. All cases have been followed in similar manner. The histopathology report of a biopsy specimen of the liver in this case was: "Periportal area shows minimal fibrosis with lymphocytes, eosinophils, and polymorphonuclear leukocytes. There is also a mild focal necrosis of some periportal hepatic parenchymal cells. Some sections disclose inspissated bile plugging tiny canaliculi. Proliferation and distortion of small bile ducts are evident." Biopsies of liver specimens performed in the other cases showed similar findings.

An additional patient was studied at another hospital.<sup>13</sup> Jaundice began more than three weeks after stopping chlorpromazine; only 0.025 gram of the drug was given daily for six days. Serum bilirubin was 14 mg per 100 ml and alkaline phosphatase was 34 Bodansky units when laparotomy was done, although blood eosinophilia of 32 per cent suggested drug-induced icterus. No gross pathologic lesions were seen at operation, but a biopsy specimen of the liver showed the characteristic features described in chlorpromazine hepatitis.



TABLE 2. Laboratory data: Case report of chlorpromazine jaundice\*

Year 1955	12-8	12-12	12-14	12-16	12-19	12-21	12-23	12-27	12-30
Icteric index									
Bilirubin, mg/100 ml	20	85		50	25		15	10	6
1 minute									
30 minutes	1.5	4.5	6.3	5.15	3.0		1.1	0.8	0.5
White blood cell count	2.2	6.0	8.8	7.2	4.0		1.8	1.25	0.7
Per cent eosinophils	5,100	14,600	16,900	13,600	15,500	10,500	11,000	9,600	9,200
Erythrocyte sedimentation rate	12	13	10	8	10	5	2	3	2
Cholesterol (total) mg/100 ml	23		33	25		37			24
Cholesterol (esters) mg/100 ml		330		327	337		250		
Cephalin cholesterol flocculation		240		240	170		170		
Thymol turbidity		Neg			Neg				Neg
Cholinesterase		0.8			0.8				0.8
		75% of normal			Normal				
Alkaline phosphatase (Bodansky units)	4.2	6.3	6.7	6.7	5.5			3.1	
Serum proteins:									
Albumin (g/100 ml)									5.0
Globulin (g/100 ml)		4.9		4.8	4.8				2.4
Total (g/100 ml)		2.2		2.2	1.9				7.4
Protein electrophoresis		7.1	Normal pattern	7.0	6.7				Normal pattern

TABLE 2. Laboratory data: Case report of chlorpromazine jaundice\*—Continued

Year 1955	12-8	12-12	12-14	12-16	12-19	12-21	12-23	12-27	12-30
Transaminase activity (SGO-T) in units			150 (normal 5-40)			70		5.5% retention	20
Bromsulfalein excretion 45 min/5 mg		1.0				68.0			
Fecal urobilinogen mg/24 hr									
Urine:									
Bile (mg/24 hr)	2+	4+	3+	1+	-	-	-		
Urobilinogen (mg/24 hr)		0.02		0.06		4.0			
Porphobilinogen	neg	neg		neg		neg			
Serum amylase (control) in units			354 180		304 156		180 156		

\*Liver biopsy performed on 12-12-55.

X-ray chest (12-8-55), flat plate of abdomen (12-12-55), and cholecystogram (12-19-55): all normal.

Urinalysis remained within normal limits except for bilirubin; bct. bleeding time, coagulation time, prothrombin activity, electrocardiogram: all normal. Fasting blood sugar (true), 80 mg/100 ml; blood urea nitrogen, 11 mg/100 ml (12-12-55).

## AGRANULOCYTOSIS FROM CHLORPROMAZINE

The possibility that patients treated with chlorpromazine may develop agranulocytosis is not as widely appreciated as it should be, since this serious complication occurs much more seldom than chlorpromazine jaundice. Fever, jaundice, and skin eruptions during the early weeks of treatment should be taken as danger signals and compel repeated examination of the blood, if not withdrawal of the drug.

Ulcerative stomatitis, particularly if it occurs at about the sixth week of treatment, should be an absolute indication for the immediate cessation of therapy.<sup>14</sup> One case concerns a patient in whom jaundice was followed by agranulocytosis and death.<sup>15</sup> A causative relationship in this case between the administration of chlorpromazine, subsequent jaundice, and agranulocytosis can only be assumed. The circumstantial evidence, however, is strong in view of accumulating reports. The earlier reports are summarized in table 3.

The mechanism of the production of agranulocytosis and the therapeutic approach to this disorder are discussed in a review by Rotstein, Fricke, and Schiele.<sup>16</sup> It is suggested that chlorpromazine agranulocytosis occurs within eight weeks after the drug is started, and most cases to date have occurred in patients over 50 years of age. Unpublished reports of agranulocytosis attributed to use of chlorpromazine total more than 50 cases with at least 17 deaths.<sup>17</sup> At the rather alarming rate these cases are accumulating, the drug may come to rank as an offender comparable to chloramphenicol, the thiourea derivatives, several antiepileptic drugs, and many other new drugs known to cause fatal agranulocytosis.

## SUMMARY AND CONCLUSIONS

A study has been made of the better documented reports of chlorpromazine jaundice and agranulocytosis. The important features of these complications have been reviewed.

Chlorpromazine-induced jaundice is of the intrahepatic cholestatic type, and there is usually no associated hepatocellular damage. Nevertheless, several deaths from chlorpromazine hepatitis have been reported. Since the clinicopathologic syndrome of primary intrahepatic cholestasis may have diverse causes, the jaundice may offer considerable difficulty in differential diagnosis. Jaundice may occur several weeks after discontinuing the drug, and it may persist for many months, irrespective of the amount of drug given. In cases of obstructive jaundice in which careful questioning of the patient discloses recent intake of even small amounts of chlorpromazine, operation should be deferred until a complete investigation is made to rule out the possibility of drug toxicity. The transaminase test is valuable in excluding

TABLE 3. *Agranulocytosis associated with chlorpromazine administration (1954-1955)*

Author	Case no.	Chlorpromazine			Lowest white blood cell count	Differential (per cent)	Bone marrow examination	Remarks
		Daily dosage (mg)	Total dosage (grams)	Duration of treatment (days)				
Boleman <sup>24</sup>	1	280	6.0	60	500	100 leukocytes	Aplastic marrow	Death 2 days after onset of diarrhea, fever to 105°F, increasing pulmonary edema. (Small doses of phenobarbital had also been given. A few cases of agranulocytosis from phenobarbital have been reported.)
Hodges & LaZerte <sup>15</sup>	2	50	1.4	28	4,900	99 leukocytes 1 monocytes	Hypocellular	Death. Exploratory laparotomy one week prior to death because of possible "surgical" jaundice. Biliary tract and adjacent organs normal. Liver biopsy characteristic of chlorpromazine hepatitis. ACTH given after onset of jaundice and prior to agranulocytosis without benefit.
Lomas <sup>25</sup>	3	250-300	6.0	21	680	89 leukocytes 11 neutrophils	Not done	Recovery after 5 days. Cortisone used in addition to antibiotics.
Munch-Petersen <sup>26</sup>	4	200-250	10.8	48	800	86 leukocytes 14 neutrophils	Not done	Recovery after 9 days.

TABLE 3. *Aggranulocytosis associated with chlorpromazine administration (1954-1955)*—(continued)

Author	Case no.	Chlorpromazine			Lowest white blood cell count	Differential (per cent)	Bone marrow examination	Remarks
		Daily dosage (mg)	Total dosage (grams)	Duration of treatment (days)				
Glacabini & Lancesius <sup>27</sup>	5		Not stated		900	78 leukocytes 22 neutrophils	Not done	Recovery after 40 days.
Tucker <sup>24</sup>	6	75-150	5.5	41	900	95 leukocytes 5 neutrophils	Not done	Death. Clear-cut clinical evidence of chlorpromazine sensitivity (erythema and rash) preceded agranulocytosis by 2½ weeks. No autopsy.
Prokopowycz <sup>24</sup>	7	100-150	5.8	50	3,500	79 leukocytes 20 monocytes 4 myelocytes 6 neutrophils	Not done	Death in 36 hours after onset of agranulocytosis. No autopsy.
Rotstein, Frick, & Schiele <sup>18</sup>	8	75-100	4.0	50	350	100 lymphocytes	Hypocellular with virtual absence of granulocytes	Complete recovery with normal bone marrow 19 days after onset of symptoms. Fall in hemoglobin from 16.0 to 10.8 g/100 ml within 6 weeks after drug started.

the possibility of concurrent exposure of patients to other hepatotoxic or icterogenic agents or conditions. Increased transaminase activity has been found to precede the development of jaundice from chlorpromazine.

During the first two months of therapy it is recommended that a urinalysis be done for bile twice a week, and that frequent white cell counts be made during this period and whenever else indicated, especially when fever, sore throat, or skin eruption suggests the presence of sensitivity to the drug. If the blood serum appears icteric, serum bilirubin, alkaline phosphatase activity, and other liver function studies are indicated, in all cases of toxic reactions should be carefully studied. However, no laboratory data can be substituted for careful, continued, clinical observation of the patient.

It would seem wise to avoid chlorpromazine therapy when infectious hepatitis is endemic, in the presence of liver disease, in malnourished patients, and when other potentially hepatotoxic agents have been used. Sparine (brand of promazine) can be safely given if a patient has previously been sensitive to chlorpromazine.

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## RESENTMENT TO ANTIBIOTICS

To those of us who, like Ambrose Pare, believe in the fundamental normalcy of the healing processes in man when tissues are tenderly handled and left so far as possible in their natural state, there is neither need nor justification for the surgeon routinely to divide the responsibility for an intestinal anastomosis between his surgical skill and the antibiotics. We may even wonder if the reaction, mild or fatal, which occasionally follows the use of these agents may not suggest resentment on the part of the body to their interference with a function which it is so well devised to carry out.

—LELAND S. MCKITTRICK, M. D. .  
in *Surgery, Gynecology and Obstetrics*  
p. 375, Sept. 1954

# PSYCHOLOGICAL COMPARISON OF AUTOMOBILE DRIVERS

## Accident- and Violation-Free Versus Accident-Violation-Incurring Drivers

FREDERICK L. MCGUIRE, *Lieutenant, MSC, USN*

**T**HE PROBLEM of highway safety, because of the thousands of lives and billions of dollars expended each year in automobile accidents, is one of our foremost social problems. Adequate descriptions of this carnage and waste appear elsewhere.<sup>1-3</sup>

The concept of unequal liability<sup>4</sup> (often referred to as accident proneness) prompted a widespread search for factors which make one person more liable to accidents than another. Most of the earlier studies were concerned with psychophysics, investigating such factors as vision, hearing, reaction time, and co-ordination. More recent research, dealing primarily with sociologic and personality factors as possible correlates of accident frequency,<sup>5-7</sup> has made it apparent that psychophysical measurements of human performance are not adequate for accident prediction even though there are instances in which a statistical significance can be demonstrated.<sup>8</sup>

Previous investigations of personality and biographical factors as related to automobile accidents have likewise produced little evidence that is conclusive in itself, because they were not always carefully controlled. The findings were of enough significance, however, to indicate that this approach to the problem might be fruitful.<sup>5-7</sup> In nearly all of this work a basic difficulty in methods was encountered. Analyzing the many personal and situational factors that must take place in exact sequence for an accident to occur becomes an extremely complex problem. The statistical manipulation of these variables would be an impossible task, since many of them are intangible and cannot be measured adequately.

The hypothesis of accident proneness assumes that a significant number of people have qualities in common that predispose



them to accidents, and further assumes that these qualities are relatively stable and amenable to measurement. The limited success met by the use of objective-type measuring technics indicates, however, that accident-producing qualities either do not possess these two attributes, or that the technics employed have not been adequate. It would appear, therefore, that if we are to achieve success in differentiating automobile drivers, a new approach must be sought.

The emphasis in the study here reported falls upon the accident- and violation-free group in an attempt to outline personality traits uniformly present in accident-free individuals. There are four reasons why it is logical to study the safe driver rather than the accident repeater: (1) It is the safe driver we wish to select for taxis, buses, trucks, and other vehicles. (2) The accident repeater contributes not more than three to four per cent to the accident problem.<sup>18</sup> (3) The safe driver is more easily defined operationally. (4) Many unsafe drivers do not fall in the accident-repeater classification. The experimental design of this study is based on the assumption that the accident- and violation-free driver belongs to a homogeneous group. That is, prolonged safe driving can be produced only by adhering to a common set of rules and regulations of conduct and therefore must be produced by drivers with similar attitudes and behavior patterns. On the other hand, a person may be accident-prone for as many reasons as there are patterns of maladjustment, and a particular member of the group need not bear any similarity to any other member except in terms of his accident record.

### METHOD

Two groups of 67 subjects each, selected and carefully matched by methods previously described,<sup>19</sup> were compared in this study. One group was chosen from Camp Lejeune accident records and consisted of men each of whom had had at least one accident within recent months in which he had also violated a moving traffic regulation. The other group comprised persons whose answers to a questionnaire indicated that they had neither been involved in an accident nor been cited for a traffic violation of any type throughout their driving careers, and who in other ways matched the accident group.

Every subject in each group, as reported in detail previously,<sup>19</sup> received extensive psychometric testing plus a personal interview. From the results of the various tests given, the scores selected for analysis of differences between the two groups were those of the Minnesota Multiphasic Personality Inventory (MMPI), the Bell Adjustment Inventory (Bell), the Kuder Preference Record-Personal (Kuder), and the Rosenzweig Picture Frustration Study (Rosenzweig). These tests, plus the miscellaneous attitude

items, were subjected to item analysis, and the items that differentiated between the two groups by at least a 5 per cent level of confidence were examined for personality, sociologic, and attitude characteristics that would identify the accident- and violation-free driver. Items found to have no particular ability to describe traits of either group were not used in the interpretation.

### RESULTS AND DISCUSSION

Table 1 lists those scales of the standardized tests that produced significant differences between the two groups. It is noted that two scales of the MMPI—the Psychopathic Deviate (PD) and the Schizophrenic (Sc)—were significant.<sup>13</sup> This does not mean that the accident group is psychopathic or schizophrenic simply because its score is significantly higher than that of the accident-free group; actually, the scores of both groups lie well within the normal range. It does lend support, however, to the hypothesis that personality tests of this type are unable of differentiating between accident-incurring and accident-free populations.

TABLE 1. *Results of test scales that differentiated between groups*

Test scale	Accident-free group		Accident group		Critical ratio
	Mean	S. D.*	Mean	S. D.*	
Minnesota Multiphasic Personality Inventory					
Psychopathic deviate	15.7610	03.9161	19.4630	04.4800	3.0539
Schizophrenic	08.7460	06.4440	12.0300	08.9363	2.4215
Rosenzweig Picture Frustration Study					
Ego-defensive	59.3000	11.1530	53.3000	10.1700	3.2290
Need-persistence	24.9000	10.3200	30.7000	09.4500	3.3680

\*Standard deviation

The Rosenzweig showed significant differences on the Ego-Defensive (E-D) and Need-Persistence (N-P) scales.<sup>14</sup> As with the MMPI scales, the evidence is not sufficient to allow more than speculation as to the meaning of these differences. This is especially true because the Rosenzweig is still in the process of being validated.<sup>15</sup> If one examines the various possible types of response under these two scales, it becomes evident that it is not possible to conclude much about the mode of reaction to frustration for either group, or to infer personality dynamics. It was possible to obtain separate scores based on an item analysis of the Rosenzweig. When the two groups were scored on the basis of these items the scores produced a biserial correlation of 0.53 with the criteria. The results of this work were reported previously.<sup>11</sup>

Item analysis disclosed that about 85 items from the Bell, MMPI, Fuder, and the collection of miscellaneous attitude items were significant to at least the 5 per cent level of confidence (c. r. of 1.96 or more). An examination of these items produced definite and consistent psychological patterns. Thus it became possible to describe some of the traits that tend to be associated with accident- and violation-free behavior on the highway.

When compared with the accident-violation driver, the accident- and violation-free driver shows the characteristics listed in the following tabulation. The figures in parenthesis after each item refer to corresponding items in the Safe Driver Inventory Test."

1. *Is more conservative and moderate in his attitudes*

- a. Less attracted to the use of alcohol. (21, 83)
- b. Less attracted to taverns and liquor parties. (79, 80)
- c. Does not like to see women smoke. (29)
- d. Goes to church more often and is more attached to the church. (9, 81, 82)
- e. Prays more often. (33)
- f. Does not as readily agree that war is necessary under any conditions. (72, 73)
- g. Is more careful whom he trusts. (23, 24).
- h. Does not feel he has to bet on a race or game in order to enjoy it. (14)
- i. Is more concerned over his health. (2)
- j. Is less in favor of socialism. (86)

2. *Is socially more efficient*

- a. Has a greater liking for working with people. (55C, 57B)
- b. Has less difficulty dealing with groups. (70, 56B)
- c. Finds it easier to find interesting things to do. (1)
- d. Has a kinder attitude toward people. (61A)

3. *Is socially more stable*

- a. Doesn't feel like ricking fights as often. (8, 10)
- b. Doesn't lose his temper as easily. (22)
- c. Is not as easily upset or apt to take every little thing to heart. (28)
- d. Is happier with his job. (66)

4. *Has more mature outlook*

- a. Isn't as quick to blame others for his troubles. (12, 15)
- b. Isn't as prone to cry over spilt milk. (67)
- c. Has fewer misgivings about the past. (5)

5. *Has different tastes and interests*

- a. Has greater liking for:  
(1) Poetry. (5, 42B)

- (2) Growing plants and collecting flowers. (16)
  - (3) Reading history. (35)
  - (4) Attending lectures on serious subjects. (30)
  - b. Has less liking for:
    - (1) Attending exclusive night clubs. (54A)
    - (2) Dog and horse races. (42C, 85)
    - (3) Being an auto race driver. (31)
  - c. Has greater interest in education and science. (84, 88)
6. *Is more conscientious and ambitious*
- a. More willing to accept responsibility. (40C, 51A)
  - b. Can make decisions more easily. (18)
  - c. Has a higher aspiration level. (45C, 51C)
  - d. Sets higher workmanship standards for himself. (34)
  - e. Is not as easily influenced by other people. (8)
  - f. Is more concerned with his personal independence. (68)
7. *Had happier childhood*
- a. Had fewer arguments with his family. (10)
  - b. Had fewer impulses to run away from home. (27, 71)
  - c. Was happier and more productive in school. (3, 20, 26)
8. *Has healthier attitude toward law*
- a. Is more ready to believe law helps the common man. (77)
  - b. Has had less trouble with the law. (25)
  - c. Is more concerned with staying out of trouble with the law. (19)
9. *Has healthier attitude toward operating a vehicle on the highway*
- a. Doesn't believe accidents are mostly due to luck. (76, 78)
  - b. Believes a good driver must always pay close attention to his driving. (75)
  - c. Is more willing to share highway with trailer trucks and other vehicles. (74)

In addition to using the statistical method in choosing the significant items, two other criteria can be employed in order to test their validity. The first is to note whether or not there is any contradiction between test items. For example, there were several items concerning the school history and home life of the testee. If these items were chosen by chance only, it is likely that at one point the accident group would have indicated a happier school or home life, but in response to a similar item might have indicated the opposite. One of the two groups might have reported that they prayed more often, yet have indicated a less frequent church attendance; or they might have indicated a greater liking for liquor parties, yet have shown that they used alcohol to a lesser extent than the other group. The list of items chosen do not contain any such contradictions.

The second test is one of chance. Using the 5 per cent level of confidence as a criterion, it can be said that by chance

alone 5 out of every 100 test items would be chosen as being statistically significant. This presupposes that every item has as much chance of being selected as every other. Because of the heterogeneous nature of the different test items in the original pool and their uneven distribution, this prerequisite cannot be fulfilled. Therefore, if more than the expected number of items were selected as being significant it is a point in favor of the validity of the chosen items; however, if the number of items chosen was less than expected the evidence is not negative.

In general, the chosen items meet the second test, but I do not rely on it as an adequate test and am more inclined to accept the test of intra-item consistency. When these items were placed in test form and submitted to cross-validation groups similar to those used in this study, the results supported their validity.<sup>12</sup> Work done by other investigators also tends to support the conclusions drawn from them.

The characteristics of the accident-violation-free driver, as they have been outlined here, tend to lend themselves very well to that kind of driving behavior that is generally thought to be necessary for accident-free operation. In other words, the results are what one would expect. For example, we would certainly expect the safe driver to have a healthier attitude toward law. The fact that he is a more responsible person and is more conservative in his use of alcohol also logically fits the picture of a safer driver. The fact that he is more intellectually inclined and more at home with ideas equips him better to understand that traffic signs and laws are the attempt of society to protect itself—to understand that group living requires certain responsible behavior.

Because driving upon the highway is essentially an interpersonal situation, we would expect that the person who gets along best on the highway also gets along best with people. It is fitting that our accident- and violation-free driving group should bear the earmarks of better adjustment—a smoother home life and more ease in his relations with people.

Tillman's work agrees with what has been found in this study. Due to differences in the techniques used, certain characteristics of the groups are emphasized more in this study than in Tillman's, and there are differences in the kinds of characteristics listed, but in no instance do Tillman's data contradict any of our findings. His high-accident population of taxi drivers is more extreme in their "undesirable" qualities; they seem to be borderline psychopathic deviates. This may be due to the type of population he used for the study and not be a true description of all high-accident drivers.

Tillman's data were gathered by interview techniques. He spent three months in informal fashion with the drivers, riding in their

cabs and talking to them between fires. In spite of possible sources of bias (Tillman apparently knew in advance which drivers were in the high-accident and low-accident groups), the method used has the advantage of being able to handle and evaluate many variables at once and is limited only by the skill of the investigator. Unskilled or semiskilled persons cannot apply the technique, and the results do not permit objective analysis. The questionnaire method, as used in this study, is able to circumvent these two objections. Both methods have definite worth, and it is important to note that they yield similar results.

Work by Dunbar<sup>14</sup> with hospital fracture cases, utilizing interview, biographic, and Rorschach data, arrived at conclusions compatible with the results of this study and of Tillman's. A preliminary report of work now being done at the University of Colorado<sup>15</sup> indicates that its sample of drivers possess personality characteristics consistent with those reported herein.

### SUMMARY AND CONCLUSIONS

Two groups of automobile drivers, each consisting of 67 subjects, were tested and interviewed. One group comprised drivers who in all their driving history had never incurred a motor vehicle violation or been involved in an automobile accident of any kind. The other group was composed of drivers who recently had been involved in at least one accident in which they had incurred a moving violation.

An item analysis of the test items (excluding the Rosenzweig and the sentence-completion test) provided a method of describing certain personality, sociologic, and attitudinal differences between the two groups. It was determined that the accident- and violation-free driver is more mature, conservative, and intellectual in his interests and tastes, has a higher aspiration level, and is the product of a happier family background than is the accident-violation-incurring driver.

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### RESEARCH AND THE PUBLIC

"Over the next decade, the public image of science, of medical research, and of the scientist may become more realistic. Research is more widely publicized through newspapers, magazines, radio, and television than at any time in the past. The public's avidity, spontaneous or artificially stimulated, for information on research is remarkable. The emergence of scientific writing for popular consumption as a clear professional journalistic specialty is a most encouraging development for the future. The development of a mature attitude by scientists toward their responsibilities and their rights in communicating to the public is another encouraging factor."

—JAMES A. SHANNON, M. D.  
in *Journal of the American Medical Association*, p. 1030, Mar. 24, 1956

# A STATISTICAL STUDY OF ALVEOLAR OSTEITIS

SAM R. ADKISSON, *Captain, USAF (DC)*

PERRY F. HARRIS, *Captain, USAF (DC)*

**A**LVEOLAR osteitis has consistently been the most unpleasant and the most frequent single complication following the extraction of teeth. A specific definition for alveolar osteitis (or "dry socket," as it is more commonly known) is lacking in the literature. The clinical entity most commonly diagnosed as alveolar osteitis is generally characterized by one or more of the following conditions: (1) pain, (2) loss of a normal blood clot in the socket, (3) denuded bone surfaces and necrotic material in the socket, (4) delayed healing, and (5) foul odor. A number of causative factors has been suggested and a variety of treatments used. It may be concluded that the cause or causes and mechanism of alveolar osteitis are not yet fully understood. This particular study has been undertaken in order to determine any relevant statistical patterns related to alveolar osteitis as observed among personnel of the U. S. Air Force.

## MATERIAL AND METHODS

All data for this study were collected from AF Form 309, Dental Health Record, of U. S. Air Force personnel on active duty. A series of 5,500 consecutive clinical records was screened for recorded cases of alveolar osteitis. No distinction was made as to grade or rank of the patient in the collection of data.

In the series of 5,500 clinical records surveyed, there were found 116 (2.10 per cent) patients in whom alveolar osteitis had been diagnosed and treated. The distribution of cases by age of the patient is not considered significant, as the incidence seemed to be well spread over the age group of men in active military service who required extractions (table 1).

Considerable seasonal variation in the occurrence of alveolar osteitis was observed (fig. 1). The peak of occurrence was reached in March, following a rise through January and February. The month with fewest cases treated is June. Approximately 43 per

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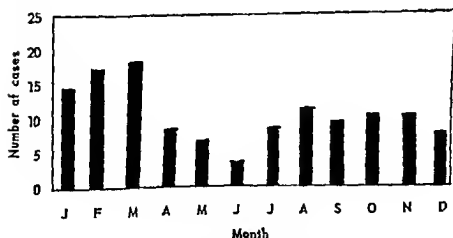
From U. S. Air Force Hospital, Brookley Air Force Base, Ala. Capt. Adkisson is now assigned to U. S. Air Force Hospital, Olmsted Air Force Base, Middletown, Pa.



TABLE 1. *Distribution of cases by age of patient*

Age	No. of cases	Age	No. of cases	Age	No. of cases	Age	No. of cases
19	9	28	6	37	1	46	0
20	7	29	6	38	0	47	0
21	4	30	7	39	1	48	0
22	9	31	4	40	2	49	0
23	13	32	3	41	1	50	0
24	7	33	2	42	2	51	1
25	4	34	2	43	1	52	0
26	7	35	3	44	0	53	0
27	5	36	8	45	0	54	1

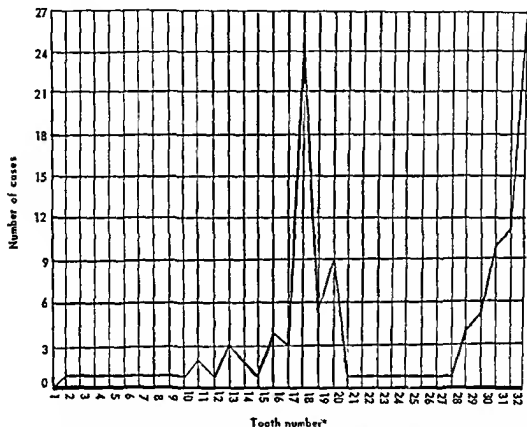
cent of all cases occurred in the three months' period of January through March. This is usually considered to be the season in which general body resistance is at a low level and upper respiratory infections are active. That the incidence of cases occurring in December is lower is probably due to the fact that many servicemen are on leave and fewer teeth are extracted during this period.

Figure 1. *Distribution of cases by month of occurrence.*

No cases in conjunction with pericoronal infections in the upper arch were found in this study. All cases of pericoronal

infection studied were associated with lower third molars. Of the total of 51 such cases, 34 (66.7 per cent) were associated with previous pericoronal infection. This fact points up the importance of carefully controlling pericoronal infections before extracting lower third molars.

There is a marked predilection for alveolar osteitis as the tooth location becomes more posterior. The peaks of incidence are in the lower third molar areas (44.0 per cent) with lower molar and bicuspid areas next in order (fig. 2).



\*The teeth are numbered 1 through 32, with No. 1 being the upper right third molar; No. 16 being the upper left third molar; No. 17 being the lower left third molar; and No. 32 being the lower right third molar.

Figure 2. Distribution of cases by location of tooth involved.

The removal of lower teeth much more often results in alveolar osteitis. About 84 out of every 100 cases are in the lower arch (table 2). The variation in occurrence between right and left sides is not considered significant.

Alveolar osteitis more often follows a single extraction than a multiple extraction. Of all cases studied, 80.2 per cent were associated with a single extraction. Surgical removal was performed in 34.5 per cent of all extractions, and in 58.8 per cent of extractions in lower third molars. Trauma, therefore, may not

be as important in causing alveolar osteitis as hitherto believed. Sutures were used for closure in 44.8 per cent of the cases studied. The variation between these cases and those in which sutures were not used is not considered significant.

TABLE 2. *Distribution of various findings in 116 patients with alveolar osteitis*

Findings and occurrence		Number of cases
Location	Arch	
	Upper	19
	Lower	97
	Side of arch	
	Right	63
	Left	53
Extractions	Number	
	Single	93
	Multiple	23
	Type, lower third molars	
	Simple (uncomplicated)	21
	Surgical	30
Treatment	Type, all cases	
	Simple (uncomplicated)	76
	Surgical	40
	Sutures	
	Used	52
	Not used	64
History	Hypnotics or sedatives	
	Used	20
	Not used	96
	Antibiotics	
	Used	22
	Not used	94
History	Previous lesions	
	Yes	38
	No	78

### POSTOPERATIVE PERIOD

The period of time elapsing between extraction and the institution of treatment for alveolar osteitis varied with the individual case (fig. 3). The number of patients returning for treatment rose from the first postoperative day to a peak on the fourth postoperative day. In 70.7 per cent of all cases, treatment was begun by the end of the fourth postoperative day. By the end of the first postoperative week, 95.7 per cent of all patients had returned for treatment.

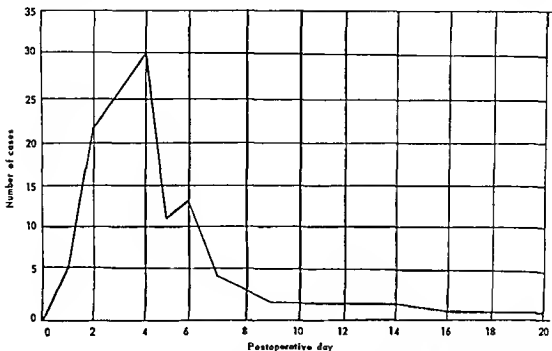


Figure 3. Distribution of cases by postoperative day on which treatment was begun.

The number of days' treatment required varied with the individual case (fig. 4). The peak number of cases was completed by the end of five days of treatment. By the end of one week of treatment 60.3 per cent of all cases were completed. By the end of two weeks of treatment, 87.1 per cent of all cases were discharged without further treatment. A few resistant cases required treatment for from three to four weeks.

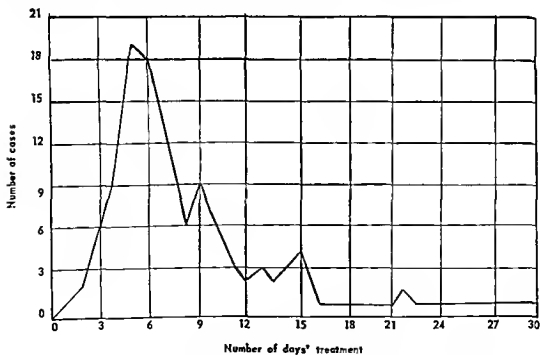


Figure 4. Distribution of cases by the number of days' treatment required.

The prescription of sedatives or hypnotics to control pain and/or induce sleep varied with the needs of the individual patient. Of the cases herein reported, 82.7 per cent required no medication other than the local treatment of the affected socket (table 2). There seems to be no uniformity of opinion among dentists as to the efficacy of systematically administered antibiotics in the treatment of alveolar osteitis. Of the patients studied only 19.0 per cent were given antibiotics as a part of treatment. The sample reflected in this survey on this point is not sufficiently great to justify any conclusions. About 33 per cent of the patients considered in this study had previously been treated for alveolar osteitis. This seems to indicate that certain patients have a greater tendency to develop an alveolar osteitis than do others.

Although the interrelation of the various dental diseases is not well understood, there appears to be a direct correlation between the incidence of alveolar osteitis and other forms of dental disease, with osteitis tending to occur in mouths where other diseases are active. The 116 subjects of this study who had alveolar osteitis also had, on the average, 2.3 decayed, 6.0 missing, and 7.7 filled teeth.

### CONCLUSIONS

A statistical study of alveolar osteitis has been presented in which the incidence of this postoperative complication has been correlated with reference to a series of some 15 variables. It may be concluded that alveolar osteitis does follow certain patterns within limits as described. The whole subject of alveolar osteitis is deserving of further study in order that our methods of prevention and treatment be improved.

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### CARCINOMA OF THE BREAST

More than 16,000 women die annually of carcinoma of the breast in the United States, and its incidence is increasing at the rate of one percent. However, the present outlook is not so discouraging when it is realized that 10,000 of the deaths could be prevented if the disease were treated in the early stages. The education of women to a correct method of examination every month and emphasizing the necessity of reporting to their physicians every six months, or at any time a suspicious lesion occurs, is a big step forward.

—RALPH A. MC GILL, M. D.  
in *Journal of the International College  
of Surgeons*, p. 42, Jan. 1954

# THE QUANTITATIVE INTERPRETATION OF BALLISTOCARDIOGRAMS

## *A New Approach*

DONALD C. FISCHER, *Captain, USAF (MC)*

CARLTON L. SHMOCK, *Jr., Captain, USAF (MC)*

**B**ALLISTOCARDIOGRAPHIC interpretation continues to suffer from the lack of a truly objective basis for analysis. As the subjective element infiltrates the evaluation, there is considerable variation in the final grading of any tracing. The frequency with which disagreements in interpretation arose in our clinic prompted the development of a grading system whereby a relative number of points are assigned to each abnormal constituent of the complexes. This point system of evaluation greatly reduced the subjective error which produced most of our discrepancies.

## MATERIAL AND METHODS

The machine used in this clinic is a direct photoelectric ballistocardiograph employing an electrical filter to eliminate respiratory swing, recording through a photographic electrocardiograph equipped with an R wave injector.

Two hundred tracings from men found physically acceptable for military service were used to determine normal values for the length of the I-J segments. The lengths of I-J in inspiration and expiration were determined separately.

Our determined mean for I-J in inspiration was 10.1. The median was 9.5. Standard deviation determined from the sine curve plotted was  $\pm 2.75$ .

Similar measurements for I-J in expiration gave a mean of 7.5, a median of 7.0, and a standard deviation equal to  $\pm 2.1$ .

The importance of these determinations is discussed below.

## METHOD OF GRADING

We consider the following in evaluating a ballistocardiogram:

1. Time of onset of H wave after R wave

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From U. S. Air Force Hospital, Travis Air Force Base, Calif. Dr. Fischer is now at 3294 North Bend Road, Cincinnati, Ohio.

2. Time of occurrence of J peak after R wave
3. Respiratory variation in the lengths of I-J segment
4. Lengths of I-J in inspiration and expiration
5. Height and configuration of H wave
6. Depth and configuration of I wave
7. Configuration of J wave
8. Depth and configuration of K and M waves
9. Height of L and N waves

Normal variations of each of these factors were determined by our own experience and the reported findings of others. As suggested by Starr,<sup>1</sup> it was necessary to determine the limits of normal for length of I-J segments for our own particular type of machine (see above).

The following are considered abnormal for each component:

1. Onset of H wave more than 0.04 second after the R wave
2. Peak of the J wave less than 0.20 second or more than 0.26 second after the R wave
3. A variation of more than 50 per cent between the tallest and shortest I-J segment
4. An I-J in inspiration less than 7.5 mm in length or an I-J in expiration of less than 5.5 (for males)\*

Points assigned each abnormality are relative to the importance of that portion of the cardiac cycle which the component represents. Points are assessed against a single component only once, regardless of the number of complexes in which it is abnormal (*e. g.*, 1 point is assessed if H is abnormal in all complexes or only in expiration).

1. Abnormal H timing	1 point
2. Abnormal J timing	1 point
3. Abnormal respiratory variation	2 points
4. Small I-J in inspiration	4 points
Small I-J in expiration	2 points
5. Abnormal H waves present	1 point
6. Abnormal I waves present	1 point
7. Abnormal J waves present	1 point
8. Abnormal K or M waves present	1 point each
9. Abnormal L or N waves present	1 point each

The final grade assigned any tracing is determined by the addition of the points assessed, thus:

Normal	not more than 1 point
Grade I	2, 3, or 4 points
Grade II	5 or 6 points
Grade III	7 or more points

\*The exact range of normal for I-J segments of females is presently being determined.

Grade IV      tracing so bizarre that  
                 waves cannot be identified  
                 for measurement

### DISCUSSION

The grading of ballistocardiographic tracings by this method was compared with those involving the determination of the percentage of abnormal complexes. Four hundred tracings were originally graded by the method of Brown, Hoffman, and de Lalla,<sup>2</sup> prior to the adoption of the point system in our clinic. These were then re-evaluated according to the point system.

In 78 per cent of the tracings which were cross-graded, there was no change in the assigned grade. As was expected, *no* tracing which was *seriously* deranged improved in grade by any method of evaluation. For example, no Grade IV tracings were upgraded, and only rarely was a Grade III considered to be Grade II.

Of the records, 16.8 per cent were given an improved grade by the point system. The tracings in this group created the most arbitration in our clinic. They consisted primarily of tracings given a poorer grade by percentage determination of normal. For instance, an I to J ratio less than 1:2 or a tall H wave made it necessary to consider many otherwise normal complexes as being abnormal. Usually these tracings were taken from persons in excellent physical condition as determined by history, physical examination, and laboratory aids. We, therefore, felt justified in assuming that the point system had allowed us to classify these tracings more correctly.

Some 5.2 per cent of the tracings were given a lower grade by our method than had been determined by other methods. These were mainly recorded on males over the age of 40 years. The difference in evaluation resulted from the fact that although the tracing had a regularly recurring pattern and an I to J ratio of 1:2, suggesting a grade of normal, the I-J segments were abnormal according to our standards for I-J segment length. This is a common finding in tracings from persons beyond the fourth decade of life. However, the fact that it is common does not justify a classification of normal for this age. We are in agreement with Dock, Mandelbaum, and Mandolbaum<sup>3</sup> when they state, "Abnormal patterns in the electrocardiogram or in the ballistocardiogram result from abnormal states of the circulatory apparatus, whether the individual is young or old."

The short I-J segments in all age groups primarily suggest degeneration of the myocardial thrust and a compromise in the efficiency of the heart as a pump. We feel, therefore, that this type tracing was not normal and should have been graded as...



## SUMMARY AND CONCLUSIONS

In our clinic frequent disagreements arose in interpreting ballistocardiographic tracings using the percentage of abnormal complexes as a criterion for grading. We therefore devised a point system of grading to help eliminate the subjective element. The point system is discussed, including our standards for I-J segment length in inspiration and expiration.

Four hundred tracings originally graded by the method of Brown, Hoffman, and de Lalla were re-evaluated by the point system. In 78 per cent of the tracings the grade was not changed, in 16.8 per cent the grade was improved, and in 5.2 per cent the tracing was downgraded. The reason that a change in grade by the point system seemed warranted is discussed.

The point system of grading which we have presented has been a substantial aid in developing better quantitative interpretations of ballistocardiograms in this clinic. It has been outlined here in the hope that it may benefit others who have had similar difficulties.

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## MISINTERPRETATION

Misinterpretation of what the doctor says is so easy for the patient. Many a doctor who has given an explanation on which he pides himself would be disconcerted to learn the retailed version of his carefully chosen words. That is why lucidity is so essential. It is a difficult art to cut one's explanatory coat according to the intellectual cloth provided by the patient, and it must be especially hard for psychiatrists to word their interpretations without ambiguity, because the mind is even harder to explain than the body.

—RICHARD ASHER, M. D.

in *Lancet*, p. 759, Apr. 9, 1955

# CLINICAL RECOGNITION OF EARLY AND INSIDIOUS SCHIZOPHRENIA

JOHN W. BURKETT, *Lieutenant Colonel, MC, USA*

**E**ARLY or insidious schizophrenia is not always obvious, even to the experienced psychiatrist, because it may simulate any psychiatric disorder and many organic illnesses.<sup>1,2</sup> The resultant need to stress certain clinical features of schizophrenia became apparent to me through teaching psychiatry to general medical officers at this school and supervising the work of psychiatrists of limited clinical experience.

Although generally slighted in standard textbooks of psychiatry,<sup>3-5</sup> the clinical features discussed in this article have been found to be of special value in detecting early and insidious schizophrenia, as distinguished from "pseudoneurotic schizophrenia," first described by Hoch and Polatin.<sup>6</sup> Although these features may be noted in some patients with chronic or full-blown forms, such patients are adjusting at a definite psychotic level and present little difficulty in diagnosis.

The proper management and treatment of schizophrenic patients depend on prompt diagnosis. As a rule these patients first come to the attention of general medical officers or specialists other than psychiatrists. Unless the diagnosis is suspected, the wide variety of symptoms that these patients present is extremely confusing. They are often misdiagnosed as having organic illnesses, psychoneuroses, or character disorders ("psychopathic personalities"), or are simply dismissed as malingerers.

## ANXIETY

One of the most significant and least often recognized indications of schizophrenia is the presence of intense and prolonged anxiety. Both the subjective and objective aspects of anxiety are usually thought to be associated with the psychoneuroses. To many medical officers, complaints of "nervousness" or clinical signs of anxiety automatically signify that the patient is a "neurotic." Actually the neuroses, by their very nature, are defenses against anxiety, and severe anxiety is seldom present in the neuroses for a period of more than a few hours or days. On the other hand, it is often present in early or insidious schizo-

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From Army Medical Service School, Brooke Army Medical Center, Fort Sam Houston, Tex. Dr. Burkett is now at Veterans Administration Hospital, Sepulveda, Calif.

phrenia. The schizophrenic patient will demonstrate objective evidence of such anxiety: striking tremulousness, widely dilated pupils, flushing, and severe hyperhidrosis. Occasionally widely dilated pupils will be the first clue that a psychotic and not a neurotic condition is present.

Mild or chronic signs and symptoms of anxiety, however, are frequently present in the psychoneuroses, in which anxiety differs qualitatively as well as quantitatively from that in the psychoses. The psychoneurotic patient describes his anxiety as an unknown dread or an incomprehensible but definitely uncomfortable feeling. He is unable to explain why he has such unpleasant sensations and he tells of his resultant feelings of helplessness and exasperation. He will stress that his feelings are "silly" and defy logical explanation, and will seldom speak of his feeling of apprehension as one of "fear."

The schizophrenic on the other hand will describe his anxiety in terms of fear. He will complain of fear of dying, fear that the world is coming to an end, or fear of losing control and killing someone. The total clinical picture will, of course, necessitate consideration in order to arrive at a correct diagnosis.

Although the psychoneurotic himself is unaware of the cause of his anxiety, a detailed description of his present illness and past history will suggest probable dynamic mechanisms and defense patterns. This is illustrated by the case of a very capable but somewhat overly conscientious sergeant who developed a mild anxiety state for several days after having become a warrant officer. From his history it was learned that he had long-standing dependency needs and conflicts concerning responsibility. These were incompatible with his assumption of a position of greater responsibility. The connection between his anxiety and acceptance of a warrant was quite clear, but the patient himself was not aware of the relationship. Contrary to this, the schizophrenic's anxiety will bear little relation to his current life situation. He merely recites his symptoms over and over and no psychodynamic mechanisms are suggested. The somatic components of his anxiety will often be described in a bizarre and inexact manner. In addition, he usually relates many intense feelings, such as great hatred for some member of his immediate family or a multitude of deviant sexual impulses. These are related with little hesitation and accompanied by emotional blandness.

Thus the presence of intense and prolonged anxiety, which shows little relation to current life problems and is described as a specific fear, should alert the physician to the possible presence of schizophrenia.

#### HYPOCHONDRIACAL SYMPTOMS

Hypochondriacal symptoms in a person less than 35 years old almost always turn out to be a symptom of an underlying schizo-

phrenic process. In older patients they may occur as a manifestation of a hypochondriacal neurosis, involutional melancholia, or other psychiatric conditions. The term hypochondriacal symptom is used here in a specific manner and refers to physical symptoms for which no structural or functional disorder is present. Hypochondriacal symptoms are distinguished from symptoms of conversion reactions (hysterical symptoms) and somatization reactions (psychosomatic symptoms). In both of these reactions there is a demonstrable dysfunction. In the former, the individual attempts to defend himself against anxiety by the production of a symptom with a symbolic meaning. In the latter, anxiety is dealt with by being channelized through one portion of the autonomic nervous system and causing dysfunction of an organ or organ system. By contrast, hypochondriacal symptoms bear no relationship to actual bodily dysfunction and are often described in bizarre terms. There are often associated fantastic ideas concerning a supposed physiologic disturbance. In these instances they approach actual somatic delusions. Hypochondriacal symptoms must be distinguished from odd symptoms or descriptions of symptoms which reflect physiologic and anatomic misinformation or ignorance. A patient may, for instance, state: "I have weak kidneys," but actually mean he has a pain in the back which he assumes is related to some kidney ailment.

A physical complaint may not initially appear to be unusual. As the patient elaborates on his symptoms, however, he reveals their peculiar nature. It may require careful questioning and alertness to recognize a symptom's true significance. For instance, an initial complaint of headache may be elaborated by a statement such as "not really a pain but a feeling like the top of my head is going to blow off; the discharge from my nose indicates that the pressure is causing some outflow of brain substance." In one case an initial complaint of numbness in the arms was later found to have a more complex meaning for the patient. He actually felt that there were bubbles of air in the veins of his arms. Furthermore he believed his symptoms were the result of people trying to poison him. Unlike conversion symptoms or psychosomatic symptoms, hypochondriacal symptoms are not influenced by reassurance, placebo, or explanation.

Any hypochondriacal symptom that occurs in a young person, especially if bizarre, necessitates a careful psychiatric evaluation to consider the possibility of an underlying schizophrenic process.

#### ALCOHOLISM

Severe alcoholic over-indulgence in a young person should alert the medical officer to the possibility of a schizophrenic process. Occasional use of alcohol in the teens or early 20's is of little significance in itself, but when alcoholic intake is

quent and results in severe intoxication, an early schizophrenic process must be considered. This is especially true when alcohol is consumed for the purpose of decreasing overt anxiety or marked feelings of inferiority and inadequacy. It is of less significance when used in an effort to decrease mild social anxiety or an effort to prove that one is able to drink and is therefore mature. If a young adult patient gives a history of repeated alcoholic amnesia ("blacking out spells," "pulling a blank"), there is greater likelihood of a severe emotional disorder, which may be a schizophrenic process. Although alcohol allows the schizophrenic to make a temporary adjustment, it further interferes with his reality testing and a definite psychotic picture finally results.

### CONVERSION SYMPTOMS

Gross conversion symptoms such as hysterical paralysis of an extremity, hysterical blindness, and epileptoid seizures always suggest the possibility of a schizophrenic process, and when carefully evaluated, the patient with such a symptom is frequently found to be schizophrenic. Unless a patient with a marked conversion symptom falls into one of the following two categories, the author has found it convenient to presume him to be schizophrenic until proved otherwise:\*

1. Mentally defective or borderline mentally defective patients: Such patients may develop conversion symptoms when placed in situations with which they are intellectually or emotionally unable to cope.

2. Patients from unique cultural areas: Gross conversion reactions are fairly common in certain culturally backward areas of the United States and are well known in Puerto Rico. The frequency of bizarre epileptoid convulsions among Puerto Rican patients is common enough to have been labeled the "Puerto Rican syndrome" by some psychiatrists.

Many specific instances are known where improper management resulted from failure to recognize the basic schizophrenic process in patients who presented conversion symptoms. The consequent occurrence of acute severe psychotic episodes required electroconvulsive treatment and prolonged closed ward care. In some cases the patient failed to regain even his previous level of adjustment.

### PLASTIC SURGERY CANDIDATES

Patients who request facial plastic surgery in the absence of actual or significant disfigurement are frequently schizophrenic. This is especially true of those who seek operations for plastic surgery on the nose. The intense desire they express for such

\*This is not intended to imply that there is no diagnostic entity of conversion reaction. It is beyond the scope of this article to discuss conversion reactions per se.

operations is not reduced by careful explanation regarding the indications for plastic surgery and its limitations. Their desire for correction of minor or nonexistent disfigurements are actually early feelings of depersonalization and withdrawal from reality. Plastic surgery may precipitate a full-blown psychotic reaction in early or insidious onsets of schizophrenia.

### TINNITUS

Occasionally a chief or sole complaint of ringing or buzzing in the ears in the absence of demonstrable organic cause may be the only indication of a schizophrenic process. Such ringing or buzzing in the ears precedes the development of auditory hallucinations and other indications of an overt psychosis. Patients often disclose that the ringing resembles a rumble of voices but that they have been reluctant to report this to the medical officer. If the underlying schizophrenic process is unrecognized, repeated unrewarding special examinations result.

### SUMMARY

A few clinical hints have been given for the early recognition of schizophrenia. Teaching experience has shown that the significance of certain symptoms and signs are not universally recognized and are not stressed sufficiently in standard textbooks of psychiatry. None of the symptoms or signs mentioned are in themselves pathognomonic of schizophrenia. They should, however, alert the medical officer to the possibility that he is dealing with a basic or underlying schizophrenic process. All too frequently, patients who have early or insidious forms of schizophrenia are not recognized and are mismanaged. Often the result is repeated needless laboratory work or consultations. Sometimes mismanagement results in severe schizophrenic reactions which require prolonged hospitalization and treatment. Most unfortunate are the acts of violence and the suicides that may occur.

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# PROJECTIVE SOUND TESTING OF EMOTIONALLY ILL PATIENTS

DENNIE L. BRIGGS, *Lieutenant, MSC, USN*  
DAVID C. GAEDE, *Rear Admiral, MC, USN (Ret.)*  
HARRY A. WILMER, *Commander, MC, USNR*

**O**BJECTIVE psychologic studies of sound perception and sound association have been few, compared to the many studies of visual perception. Particularly great emphasis in psychologic testing has centered upon the Rorschach and Thematic Apperception Tests, but what is seen and how something is seen is no more important than what is heard and how something is heard.

In general, two types of sound association experiments have been reported in the literature. Skinner<sup>1</sup> described a verbal sum-mator, later called the tautophone. This is a device for repeating arbitrary samples of speech obtained by permuting and combining certain elemental speech sounds. The repetition of samples may evoke various associations. This method for studying latent speech and projection was then utilized clinically by Shakow and Rosenzweig.<sup>2</sup> Stone<sup>3</sup> presented an auditory apperception test to elicit responses in story form. Here subjects were instructed to write or tell the story based on the sounds they heard. More recently, Davids and Murray<sup>4</sup> reviewed the literature and presented their "azzageddi" test, which deals with interpretations of direct statements or projections that the subject culls forth.

A study of sound associations that we pursued during the past five years resulted in the development of a series of 21 carefully selected sounds, each lasting from 20 to 50 seconds. These were recorded on two records, which are available to others for research purposes.\* Descriptions of how the sounds were obtained from real life and how they were selected and recorded have been published elsewhere.<sup>5-7</sup>

This article reports certain features from the responses to these stimuli by Navy and Marine Corps patients from the psychi-

Presented at the annual clinical sessions of the American Medical Association, Boston, Mass., December 1955.

From the U. S. Naval Hospital, Oakland, Calif. Lt. Briggs is now at the U. S. Naval Hospital, Navy 3923, FPO, San Francisco, Calif.

\*Inquiries regarding these records should be addressed to Naval Medical Research Institute, National Naval Medical Center, Bethesda, Md. (Attention Comdr. H. A. Wilmer).

atric service in this hospital. The sample is a group that was carefully selected, not according to psychiatric diagnosis, but on the basis of a history of recent experiences in which sound played a significant part. By significant sound experiences we mean (1) traumatic events such as explosions, crashes, or gunfire, and personal sound distortions such as hearing defects, organic or hysterical; (2) psychotic sound imagery such as auditory hallucinations in which the sound quality as well as the content was of importance; and (3) unusual sound training necessitated by such service experience as sonar or listening duties, piloting a jet, or serving on a submarine. Each patient then could be thought of, in a measure, as a "sound casualty."

The technique of testing differed from the customary manner in which a psychological test is given by a specialist. Instead, the sound stimuli were used much as one would use Sodium Amytal, to stimulate anamnestic recall in order to obtain replies to specific questions relating to sound associations and apperceptions. To this end the testing was conducted by the therapist or the would-be therapist. It is of real value that the therapist himself actually hears the patient's response and notes his voice, attitude, and manner, because the insight into a patient's conflict or personality that is obtained is of immediate practical value in his care. The method is thus a device in the physician's armamentarium that may help him to obtain specific answers. This does not mean that extensive quantitative studies should not be simultaneously pursued, as is indeed being done, but that the practical usefulness of the method in treating patients need not depend upon such studies.

### THE EXPERIMENT

The sample consisted of 31 Navy and Marine Corps officer and enlisted personnel, ranging in age from 17 to 41 years. All were men, and 23 per cent had participated in combat during World War II, the Korean conflict, or both. All were hospitalized for psychiatric problems, including character disorders, neurotic difficulties, and psychotic states. Three patients were deaf in one ear, 12 had been treated with Serpasil (brand of reserpine), two had had deep insulin coma following early schizophrenic episodes, and at least three were experiencing auditory hallucinations during the time they were studied. Three were qualified submariners, one was a jet pilot, and two were senior naval officers.

The experiment consisted of presenting the patient with a series of 21 sounds—some taken from the environment, such as the radio, home, playground, and railroad station, and some selected from sound tracks of movies. The patients were told:

You are going to hear a series of recorded sounds. Some of these will be familiar, some strange. All sounds have



associations—they bring memories, stories, thoughts, or feelings to mind. This is true of music, cries, words, et cetera. Sounds have different meanings to different people. We are interested only in the meaning these sounds have for you. Tell me what your first thought is—what comes to your mind—what the sounds tell you. If you wish you may make up a story . . . .

Responses of each patient to each sound were tabulated and analyzed for accuracy of perception, unpleasantness or signs of emotional involvement with particular sounds, the use of sounds to recall personal experiences, and the elicitation of material alien or completely extraneous to the sound stimuli being presented.

**Accuracy of Sound Perception.** Not only do sounds have associations, but they call forth "sound illusions" or "mishearing" in certain individuals. The illusion is the result of mishearing or misinterpreting real auditory stimuli. Owing to established habits of rapid association or the temporary "set" of the mind, the listener mistakes the actual sound for something different. Total misperceptions of individual sounds ranged from 6 to 13 per cent, the highest being reported on a sound involving an aggressive male and a retaliating female. Here a recorded dialogue between a man and a woman, culminating with the woman declaring, "Well, I wouldn't talk if I were you," was heard variously as "I wouldn't take it if I wore you" (by a patient who went on to say that his own wife wouldn't be so quiet in that situation and that he'd rarely say such things to her), as "You certainly had nerve," and as "I wouldn't be ashamed if I were you." Another patient didn't even hear the sentence because he was upset by the preceding material.

In regard to the various sounds involving people, condensations of dialogue occurred, seemingly through selective hearing and the placing together of words that would make the final phrase coincide with the patients' own thinking. Total mishearing of one sound involving a young man calling for help amidst a crowd was observed with three patients, who reported the man as saying, "No." The sound reminded one of those patients of someone thrown to the lions, with people cheering as he was being punished. In relation to sounds involving situations other than people, for instance, the sound of running water with music being played in the background, misperceptions also were noted. One patient interpreted this sound as "still water" and then used this misinterpretation as a springboard for telling about his father's liking for the mountains, his father's desertion, his own guilt at having sided with his mother against his father, and how he felt guilty about this now and consequently had joined the service. Slips of the tongue in reporting the associations also occurred,

as in the following example with the sound just mentioned. A depressed patient whose wife had recently left him, taking their child with her, mentioned he had heard a "symphony" (symphony), while a patient with claustrophobia heard the sound as "someone in a vase" stirring liquid. When examining the life histories and present difficulties of the patients, their distortions, misperceptions, and slips in interpretations have direct bearing on their individual personalities.

**Affective Tone.** In analyzing the patients' responses, we were particularly interested in the affective quality of their associations. The protocols were scanned for material explicitly stated by the patient that would reveal his present emotional state. It soon became apparent that unpleasantness or sadness was prevalent in the protocols, and even with such rigidly applied criteria as verbal statements themselves, we found up to 23 per cent of the responses to any one sound eliciting associations of sadness, unhappiness, or depressed states. A somewhat moving sound, produced by a man reciting a sad poem against a background of organ music, elicited associations involving the funeral of a patient's father, an active hallucinatory episode involving an upraised arm about to strike someone, and projections of unhappy themes in radio programs, motion pictures, and church sermons, all with personal reference to sadness. It was found that in general the highest numbers of depressed or sad themes occurred with sounds involving human participation, and were especially apparent in relation to calls for assistance, unhappy states such as crying, and tense states involving arguments and aggressiveness. It is believed that the response to sounds portraying human situations calling for action on the part of the listener revealed the inadequacies for which the patients had had to be hospitalized. Their own ineffectualness in dealing with interpersonal relations was thus mirrored in their associations to the sounds.

**Personal Experiences.** In many instances the sounds had so much meaning to the patients that direct interpretation was entirely avoided, and the sound became merely a stimulus to recall a personal and sometimes deeply moving past experience. The frequency with which this occurred with each of the 21 sounds ranged from 7 to 26 per cent. As expected, those sounds involving human participation brought forth the greatest number of these experiences. The majority were concerned with early events or those involving the immediate family. A sound of a parent-child conflict stimulated comments such as "My own rebellion against my parents . . . ." "Like me disciplining my oldest boy . . . ." "Just like myself . . . getting beat up all the time . . . ." "We were treated like soldiers in that home . . . Is that what a home is really like?" (This last patient was raised in an orphanage and to him the sound suggested movie and TV themes of family

life in an actual home.) Another patient recalled, "My Dad talking to me for something I done wrong," and another, "Sounded like my little boy—someone's going to whip him." On a sound involving a man and woman alternately crying, one patient recalled, "Like a crying jag I had in Pearl Harbor . . . ." Another patient responded with, "Reminds me of myself—the voices," and "Like I was in a funeral home."

The power of sounds to bring forth personal experiences that have direct bearing on the illness of the patient is important diagnostically as well as therapeutically. However, it is not known if the sound perception constitutes material unique to this mode of perception—that is, if anything is revealed through this mode that could not easily be gained through interviews or other projective tests involving visual perception.

**Extraneous Material.** In some of the associations, there were remarks or meanings that seemed to be completely outside the range of the stimulus. At least one such association occurred with each sound. The greatest number (10 per cent) were related to the sound of the parent-child conflict. They occurred mainly in areas where the patient displayed considerable affect, such as disgust, fright, or sorrow. In one case a patient with a hyperalarm reaction asked, "Have you ever noticed the shadow on your wall made by the fan?" He had associated the shadows with the faces of Lincoln and Washington, which was an almost total rejection of the actual sound stimuli. The patient's own history is not lacking in father-son conflict.

Some of the material was set off by the association itself, as if it awakened other memories of the past. Sometimes the patients went on to give personal opinions and reveal wishes, such as: "The old man deserved to have a couple of his arms broken or shot off," and then went beyond the sound in their associations. When presented with a sound of someone walking, one patient recounted his experiences in Korea while another talked of the crying of small children being kicked around.

Extraneous material, either given as associations or stimulated by the sound, plus the association itself, seemed to be related to misperceptions, and in most instances was directly connected with material in the patient's life history.

### CASE REPORTS

Two case studies are presented briefly, to illustrate possible applications of sound associations and their meanings in specific sound situations.

**Case 1.** A Navy pilot was hospitalized with paralysis of the lower extremities. Although his illness was eventually established as a conversion reaction and confirmed by numerous civilian and military con-

sultants, he could not accept the idea that his difficulty could have any psychologic basis, although it had occurred immediately prior to his squadron being sent to sea. His sound associations and behavior during the sound testing offered confirmatory evidence as to the nature of his difficulties and gave even greater insight into the nature of his thinking. The manner in which he reported his associations, using phrases such as, "It's quite obviously . . ." "No question about that one . . ." "I'm sure that was what it was . . ." et cetera, gave indications of his use of rigid, concrete thinking. His rationalizations and denial of emotion supplied further insight into his illness. Typically he stated, "I have no personal associations to the sounds—they do not apply to me," and "I don't suppose you could say that the people were crying . . ." Qualifying and justifying were too frequent not to have meaning.

**Case 2.** A young married submariner entered the hospital with a diagnosis of possible epilepsy. He had been in the conning tower of a submarine when an explosion occurred in which several men lost their lives. The patient revealed that he was impressed with the fact that such things could happen, and had conscious fears that an explosion might occur again. He also reported having "accident dreams" following the explosion. His sound associations were replete with specific anxieties concerning space, movement, and threat. The submarine, being the epitome of controlled environmental stress, became a realistic and threatening sound situation.

While submerged, the submariner lives entirely in a compartmentalized sound world, where sound is his only means to gauge reality. Reaction to sound situations (stimuli)—for example, the diving alarm, the surfacing alarm, and sonar pings—are means of expeditious communication requiring action more rapid than human verbal means will allow. In an enclosed chamber where there are crowded a fantastic number of instruments and indicators which are the only points of reference to the outside world, a submariner's optimum function requires the epitome of control. In contrast, the aviator lives in a world where visual representations of reality are experienced as well as the sounds of his machine with which he closely identifies himself as he relies on his instruments for his cues to action.

### SUMMARY

Sound associations were obtained from 31 Navy and Marine Corps patients, each of whom had had some significant sound experience in his recent life in the military situation. Their responses were analyzed in terms of accuracy of perception, emotional involvement, recall of personal experiences, and elicitation of extraneous material evoked by the sound stimuli. Two cases are presented, illustrating possible applications of projective sound testing.

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## THE FUTURE OF MEDICINE

Looking into the future we must admit that healing will no longer be the main task of the physician although still a very important one. Medicine must by necessity become preventive medicine. There is no point in letting people break down and suffer from preventable diseases. There are enough sources of suffering in the world that may not be prevented so easily. The major tasks of medicine will be the maintenance and promotion of health, the prevention of disease, healing when prevention has broken down, and finally the social rehabilitation or reintegration of the former patient into society. The doctor's place will no longer be in his office where he would sit waiting for patients; it will be the factory, the mine, the farm, the ship, wherever people convene for work. His headquarters will be the Health Center. Such a program obviously requires the close cooperation of the physician with educators, physical culturists, social workers, administrators, and statesmen. The relation between medicine and sociology will be a very close one.

—HENRY E. SIGERIST, M. D.  
in *International Record of Medicine  
and General Practice Clinics*  
p. 389, June 1955

# THE TECHNIC OF CIRCUMCISION USING LOCAL ANESTHESIA

RICHARD D. AMELAR, *Captain, USAF (MC)*

**R**EDUNDANT prepuce and phimosis produce 26 per cent of all admissions for diseases of the genito-urinary system to Air Force facilities for treatment.<sup>1</sup> The figure for circumcision is not reported concurrently, but it must be presumed that this is the fate of most of the cases in this category. On the basis of these figures it is obvious that several thousand circumcisions are performed annually throughout the military services, and that there is a concomitant high loss of effective manpower. For military expediency, the morbidity involved with the procedure of circumcision, and the attendant period of hospitalization, must be kept to an absolute minimum.

Recently, in a tour of hospitals, I was impressed with the totally unnecessary risks involved in routinely performing a high proportion of circumcisions under spinal or general anesthesia. At these hospitals, the patient is admitted at least one full day prior to circumcision and is kept there for from 5 to 10 days post-operatively, and even longer in the instance of the development of postspinal headaches or aspiration pneumonitis.

It would seem appropriate, then, to describe a simple technic for the performance of circumcision under local anesthesia. The patient can be admitted to the hospital the day of the circumcision and discharged to duty on the following day, with a total loss from duty of only 24 hours. Indeed, several medical officers and medical corpsmen promptly returned to duty following circumcision.

There is nothing original about the technic set forth below. It combines the best parts of several different recommended procedures and has evolved into a reliable procedure with a minimum of technical difficulty. It can be easily performed by any medical officer.

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From 6604th U. S. Air Force Hospital, APO 862, New York, N. Y. Dr. Amelar is now at 77 Park Ave., New York 16, N. Y.

## CONSIDERATIONS

As a preoperative medication, a barbiturate is used to produce psychic sedation and to minimize the minor systemic reactions to local anesthetics, evidenced by apprehension and psychic irritability, which may infrequently occur. For these reasons, 0.2 gram (3 grains) of Seconal (brand of secobarbital sodium) is given orally one hour prior to circumcision. No other premedication is necessary.

A 1 per cent aqueous solution of Xylocaine (brand of lidocaine hydrochloride) has been found to be the anesthetic agent of choice, but when this is not available, procaine hydrochloride may be used with satisfactory results. Xylocaine has the great advantage of having a faster and more prolonged action than procaine, with twice the potency and fewer side effects. For this procedure, a maximum of 15 to 20 ml of the 1 per cent solution is used, and this dosage is well within the limits of safety. Epinephrine is not added because its vasoconstrictor action may result in a bloodless operation, thereby masking small bleeders and increasing the possibility of hematoma formation.

Circumcision sutures should be of interrupted 0000 plain catgut on a small cutting-edge needle. The catgut is readily absorbed and the sutures fall out easily after the wound has healed. A continuous suture would tend to form a noose about the penis, and in the event of an erection produce painful strangulation. Furthermore, should a continuous suture break prematurely, the entire wound would separate.

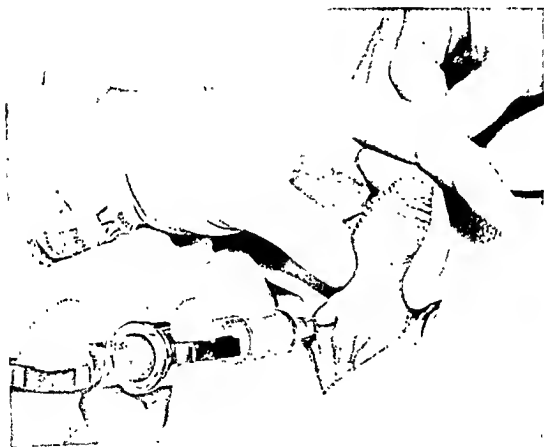
The nerve supply of the penis is derived from the pudendal nerves which divide on each side into two main branches, the dorsal and the perineal nerves. The dorsal nerves supply the skin on the dorsolateral aspects of the penis and send terminal filaments to the glans. The perineal nerves subdivide into posterior scrotal and muscular branches. The posterior scrotal nerve may send filaments to the ventral portion of the penis.

## METHOD

The area is prepared for circumcision by shaving the hair from the region of the base of the penis, then thorough scrubbing with surgical soap, and rinsing off with sterile water, followed by a 1:1,000 aqueous solution of Zephiran (brand of benzalkonium chloride). Alcoholic solutions of Merthiolate (brand of thimerosal) are not used because these can be highly irritating to the sensitive skin of the scrotum. If the prepuce cannot be retracted to clean the glans, this is done as soon as the glans is exposed by the dorsal slit.

The dorsal nerves are blocked on each side at the lateral aspect of the base of the penis. Using a 23-gauge needle, a skin wheal

is raised, and then the needle is inserted perpendicularly through the subcutaneous tissues until a definite sense of tissue resistance is felt. This resistance (Buck's fascia) is just pierced by the needle, and then after aspiration (to be sure that the needle is not within a blood vessel) 4 ml of the 1 per cent Xylocaine solution is injected (fig. 1). This procedure is repeated on the opposite side. The subcutaneous tissues on the dorsal and ventral aspects of the base of the penis are then infiltrated with 3 ml of solution each. The penis is now completely anesthetized and the circumcision may be performed. If procaine is used rather than Xylocaine, it will be necessary to wait approximately from 5 to 10 minutes before the anesthetic takes effect.



*Figure 1. Injection of anesthetic beneath Buck's fascia.*

A crushing Kelly clamp is applied to the dorsum of the prepuce in the midline and two small hemostats are used for retraction. The clamp is removed and the prepuce is cut along the crushed line, producing an almost bloodless incision. Care must be taken not to injure the glans or urethra (fig. 2). The incision is extended along the inner surface to a point 1 cm from the coronal of the glans. A suture is inserted through mucosa and skin at the apex of this incision (fig. 3). The ends of this suture are left long and are clamped for retraction during the rest of the procedure.





*Figure 2. Incision on dorsal aspect of prepuce.*



*Figure 3. Placement of suture at apex of dorsal incision.*

If only a dorsal slit is desired rather than a complete circumcision, the operation can be terminated at this point by the insertion of a few interrupted sutures along the skin margins. The prepuce is now rolled back completely and the exposed glans is thoroughly swabbed with the Zephiran solution. Using two small hemostats for retraction, a crushing Kolly clamp is applied to the midline of the ventral surface of the prepuce. The clamp is removed and the prepuce is cut along the crushed line, again stopping the incision at a point 1 cm from the coronal of the glans. A second suture is inserted through the skin and mucosa at the apex of the ventral incision. The ends of this suture are also left long and clamped for retraction. Using the two sutures as a guide, and using hemostats to stretch the prepuce, the prepuce is cut off on one side (fig. 4), leaving a 1-cm margin around the corona. The same procedure is repeated on the other side. The glans is retracted by the assistant's finger, using a gauze sponge to prevent it from slipping.



*Figure 4. Excision of redundant prepuce between dorsal and ventral incisions.*

Small bleeding points are controlled with hemostats and 0000 catgut ties. This step is most important to prevent postoperative hematoma formation. A suture for retraction is now inserted on each side, midway between the dorsal and ventral sutures. This divides the circumference of the incision into four equal quadrants, with a retraction suture at each corner. With the assistant

holding two adjacent retraction sutures, the skin edge and the edge of the mucosa are easily approximated with three evenly spaced interrupted sutures in each quadrant. The underlying subcutaneous layer is not included in the sutures. This ensures mobility in the area of approximation of the edges of the incision. The long ends of the retraction sutures are cut and a layer of gauze impregnated with petroleum jelly is placed over the incision. A bandage is applied fairly tightly to the end of the penis as another precaution against hematoma formation.

### POSTOPERATIVE CARE

Postoperatively, the patient may be ambulatory. Codeine sulfate is given orally to control any pain the patient may have in the immediate period following the circumcision, but there is no need for it after the first day. The discomfort occasioned by infrequent erections lasts only a day or two. We have not found it satisfactory to administer estrogens for the control of erections, because these drugs may have an unpredictably long action, which may be more distressing to the patient psychologically than the few erections which cause him discomfort.

The bandage is removed on the first postoperative day and the patient is started on warm soaks four times a day. For this purpose an ordinary drinking glass half filled with warm water is satisfactory. No antibiotics are necessary. All discomfort disappears by the second postoperative day. The soaks are continued until all the sutures fall out, which may take four or five days, but the patient can be back on duty and need not be hospitalized for this.

### SUMMARY

The use of spinal or general anesthesia for routine circumcision in adults is condemned as being unnecessary and hazardous. A simple, safe, and most effective technic using local anesthesia is available and is especially suitable for use by the military medical officer. Only 24 hours of hospitalization are required when this technic is used.

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*The difference between lunch and luncheon is two dollars.*

—Martin H. Fischer

# DIAMOX IN PREECLAMPSIA

HUMBERT L. RIVA, *Lieutenant Colonel, MC, USA*  
WOODROW L. PICKHARDT, *Lieutenant Colonel, MC, USA*  
MERRILL M. BECKER, *Major, MC, USA*

**A** STUDY in the management of preeclampsia was conducted at this hospital throughout 1954 and 1955 to compare the diuretic effectiveness of Diamox (brand of acetazoleamide) to that of ammonium chloride and of bed rest alone. Two hundred and twenty-five patients having mild or moderate preeclampsia with fluid retention were admitted during this period. The diagnosis was based on the criteria set forth by the Committee on Maternal Welfare.<sup>1</sup> Toxemias of pregnancy other than preeclampsia were excluded from the study. The following procedures were prescribed for all patients:

## *Diagnostic determinations:*

Blood chemistry studies to determine blood urea nitrogen, carbon dioxide combining power, albumin/globulin ratio, sedimentation rate, uric acid, and sodium chloride, on admission and repeated on the fifth day.

Complete blood count and hematocrit on admission.

Weight on admission and daily thereafter before breakfast.

Blood pressure and fetal heart tones twice daily.

Complete urinalysis, including determination of acetone and diacetic acid, every other day.

Twenty-four-hour quantitative urinalysis for albumin three times weekly.

Twenty-four-hour urinalysis for sodium daily.

Daily fluid intake and output.

Fundusoscopic examination.

## *Therapeutic regimen:*

Bed rest with bathroom privileges.

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Presented at the Regional Meeting of American Academy Obstetrics and Gynecology, Washington, D. C., on 7 April 1956.

From Walter Reed Army Hospital, Washington, D. C.

Diet: 1,000 calories, 200 mg sodium, high protein.

Phenobarbital, 0.03 gram, four times a day.

One multivitamin capsule daily.

Ferrous sulfate, 0.3 gram, three times a day.

Of the 225 patients, 78 were eliminated from the study because they were delivered during the period of management. Sixty of the remaining 147 were given 250 mg of Diamox daily for five days, 42 were given 9 grams of ammonium chloride in divided doses daily for five days, and 45 were placed on bed rest alone for the same length of time.

### RESULTS

The mean results of similar data from all patients are shown in table 1. The age, gravida, parity, weight at the beginning of pregnancy, weeks' gestation before edema appeared, weight on admission, and total weight gain were comparable for the three groups of patients.

TABLE 1. Comparison of average weight changes in 147 patients with preeclampsia of pregnancy

Data	Mean results in patients treated with		
	Diamox (60 patients)	NH <sub>4</sub> Cl (42 patients)	Bed rest (45 patients)
Age	26.63	26.98	26.80
Gravida	2.03	2.17	1.87
Parity	0.89	0.16	0.80
Weight at beginning of pregnancy	140.8	137.9	145.0
Week edema manifest	34.5	36.1	34.4
Weight on admission	167.7	164.1	171.5
Total weight gain	26.9	26.2	26.5
Weight loss after five days of therapy*	9.6	7.8	7.2

\* Average

After five days of therapy the average weight loss in those patients treated with Diamox was 9.6 pounds, as compared with an average weight loss of 7.8 pounds in those treated with ammonium chloride and of 7.2 pounds in those who were on bed rest alone.

Of the 60 patients treated with Diamox, several had paresthesias and several had blurring of vision caused by ciliary spasm.

These symptoms were transitory. There was one case of hematurin, thought to be the result of the sulfonamide-like structure of Diamox,<sup>2-11</sup> inasmuch as the patient was known to be sensitive to sulfonamide and had had a similar toxic manifestation.

### DISCUSSION

In view of the comparability of all the figures obtained, with the exception of the weight loss of the 60 patients given Diamox therapy, it seems probable that Diamox has clinical significance as an adjunct in the treatment of preeclampsia. It is a diuretic and acid base regulator of low toxicity. Peripheral and circumoral paresthesias occur in some patients, but are mild and transitory. Drowsiness, mild acidosis, blurring of vision, and fever with rashes such as those observed with sulfonamides sometimes occur.

Diamox is a nonbacteriostatic sulfonamide derivative possessing distinctly different chemical structure<sup>12</sup> and pharmacologic activity than those of the bacteriostatic sulfonamides. It is an enzyme inhibitor, acting specifically on carbonic anhydrase. Its diuretic effect is due to retardation of the reversible hydration of carbon dioxide and dehydration of carbonic acid reaction in the kidney. The result is renal loss of bicarbonate ion, which carries out sodium, water, and potassium; without loss of chloride. Diuresis and alkalization of the urine thus occur. Diamox is completely absorbed from the gastro-intestinal tract and is almost completely excreted unchanged in the urine in 24 hours.<sup>10,11</sup>

As adjunctive therapy in the elimination of excess fluid in the pregnant patient, a single daily dose of 250 to 500 mg is recommended. Therapy should be continued as long as control of edema is required. When oral therapy is impossible, the drug may be administered intravenously or intramuscularly in the same dosage as indicated in the oral form, but oral therapy should be prescribed as soon as practicable. Intravenous doses of from 750 mg to 1 gram have been used with impunity.

### SUMMARY

The effectiveness of Diamox in producing diuresis in patients having preeclampsia with edema was compared to that of ammonium chloride and of bed rest alone. The latter proved to be effective, and ammonium chloride added to bed rest was statistically no more effective. Diamox therapy, however, was about 20 per cent more effective in promoting diuresis than either bed rest alone or bed rest plus ammonium chloride.

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## PSYCHIATRIC ASPECTS OF THE MENOPAUSE

There is no single psychopathological entity in the menopausal period. The emotional illnesses of this time of life are not directly related to glandular deficiency but, rather, are the result of the individual's reaction to physiological, physical and environmental changes taking place. Significant dynamic factors are fear of the menopause itself, reaction to physical aging and loss of physical attractiveness, psychosexual conflicts, the end of the child-bearing period, the feeling of uselessness when the children are grown, and the death of loved ones. A prophylactic approach is indicated; in particular, a healthy and scientific attitude of the patient toward the menopause, and the development of personality assets and interests for the better use of leisure time.

—GEORGE J. WRIGHT, Jr., M. D.  
in *West Virginia Medical Journal*  
pp. 172-173, July 1954



## Clinicopathologic Conference

U. S. Naval Hospital, Portsmouth, Va.\*  
U. S. Naval Hospital, San Diego, Calif.\*\*

### DIABETES

#### *Case 1.*

**Summary of Clinical History.** A 34-year-old former Marine Corps major was brought to the emergency room of a naval hospital at 0515 hours on 25 June 1952. He was semicomatose on admission and within five minutes was comatose. He had been sent to the hospital by a civilian physician who had sent a note along with him stating that he had seen the patient at 0430 hours on the same day and that he thought that the patient was in diabetic or insulin shock, and recommended an emergency blood sugar. At the time, no further history was obtainable, but subsequently it was learned that he had a history of diabetes extending over a period of three years which was controlled by 20 units of insulin daily. In addition, it was learned that sometime during the previous three years he had spent a month at a Veterans Administration hospital where he was treated for cirrhosis of the liver. Ten transfusions were given him during the period of that hospitalization because of bleeding from his gastro-intestinal tract. He was treated again at a hospital for a period of three days in March 1952. Admission complaints then were weakness, fainting, dyspnea, and ascites. He had had "influenza" for the preceding few days and had taken insulin irregularly. There had been no vomiting or diarrhea. Stools were black but he had been taking some form of iron. The diagnoses on discharge were: (1) diabetes mellitus; (2) Laennec's cirrhosis, liver; and (3) secondary anemia. There was a history of "heavy drinking" for the preceding three years. He had worked

\*Rear Adm. O. B. Morrison, Jr., MC, USN, Commanding Officer. From the Pathology Service, Capt. Wilmot F. Pierce, MC, USN, Chief.

\*\*Rear Adm. Robert M. Gillett, Commanding Officer.



as a store manager for a paint company after his discharge from the Marine Corps. The day prior to the last admission, he had complained of general malaise and at approximately 0130 hours on 25 June 1952, when he was getting out of bed to go to the bathroom, had tripped on a waste basket in his bedroom and had fallen. At 0400 hours the doctor was called because the patient seemed semicomatose. The doctor advised, by telephone, that the patient be given a glass of orange juice and that he be called if there was no response. The physician was called again at 0430 hours, and when he arrived, the patient was stuporous and mumbled something about insulin. The doctor noted an "acetone breath."

**Physical Examination** On admission the patient was pale, and no blood pressure reading or pulse could be obtained. The heart sounds were regular, but weak and rapid. His lungs were clear, skin was dry, and his eyeballs were soft. Ascites and pitting edema of the ankles were evident. The spleen and liver were not definitely felt. There was areflexia. There were ecchymoses over the chest.

**Course in Hospital.** An emergency blood sugar determination was 204 mg per 100 ml; his urine was negative for sugar, acetone, and diacetic acid. He was given 10 per cent dextrose and water and 50 units of insulin intravenously. The admission note stated that this was started just before the blood was drawn for the blood sugar determination. One ampule of caffeine and sodium benzoate and one ampule of vasoxyl (brand of methoxamine hydrochloride) were given. The latter was repeated once. The patient did not respond to any of the treatment and died at 0645 hours on 25 June 1952, before any other investigative studies could be carried out.

### *Case 2.*

**Summary of Clinical History.** A retired white naval medical officer, 65 years old, was a patient in a naval hospital two times before his final admission. The first was in February 1948 because of polyuria, polydipsia, dry scaly skin, and pleuritis, all of which had been present for several months. He said that he had been completely well until a year before. However, there was a history of mesenteric thrombosis following bilateral thrombophlebitis which, in turn, had complicated varicose ulcers of both legs in 1940. No other significant past history was elicited. His father had died of carcinoma of the prostate gland. He was obese; his blood pressure 165/90 mm Hg. The liver edge was felt 4 cm below the right costal margin; there was hemosiderosis of both legs, and there was 2-plus edema of both lower extremities. His electrocardiogram was reported to be essentially normal. At that time he was found to have diabetes mellitus which was fairly easily controlled with 15 units of protamine zinc-insulin injection and 10 units of regular insulin plus a restricted diet. After a period

of 25 days he was discharged from the hospital. No liver studies were carried out at the time of that admission.

He was admitted again in February 1949 because of shortness of breath, a full feeling in his abdomen, and polyuria. He had made little if any attempt to control his diabetes during the period between these hospital admissions. His blood pressure was 180/80 mm Hg. There was ascites; the edge of the liver was palpable 3 cm below the right costal margin. Blood sugar was 296 mg per 100 ml; carbon dioxide combining power was 19.6 volumes per cent; sugar, diacetic acid, and acetone were all present in his urine. No difficulty was encountered in controlling his diabetes and he was discharged after 18 days with instructions to continue taking 25 units of regular insulin daily. During this admission, his cephalin-cholesterol flocculation was reported to be 4 plus in 24 hours; thymol turbidity was 2 units.

His last admission was on 29 July 1952, and he was comatose at that time. Members of his family stated that he had lapsed into coma the previous day. They also stated that they had noticed jaundice for the first time about two weeks before, and that the patient had had attacks of abdominal pain throughout the previous year, had eaten poorly for several months, and had used alcohol excessively.

**Physical Examination.** The patient was deeply jaundiced at the time of this admission. The liver was greatly enlarged, nodular, and hard, and the abdomen was distended with fluid. His blood pressure was 136/80 mm Hg.

**Laboratory Studies.** Hemogram and blood sugar were normal; blood urea nitrogen was 59.5 mg per 100 ml, and his urine was bile stained. An electrocardiogram showed only a prolonged Q-T interval.

**Course in Hospital.** An indwelling catheter was placed in the bladder, and he excreted about 500 ml of urine daily. Hydration was maintained with 2,000 ml of fluid daily consisting of 5 per cent dextrose solution, Ringer's solution, and normal saline, together with 20 units of insulin. His blood sugar remained normal. He did not gain consciousness and died at 0255 hours on 4 August 1952.

#### DISCUSSION

**Doctor Critzer:**\* I am going to try to present these two patients today simultaneously, for they paralleled each other very closely. Both were very lackadaisical diabetics. Their diabetes was of relatively short duration—three years in the first case and four in the second. Both had evidence of fairly severe concomitant liver disease, and both, pre-

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\*Lt. Ben L. Critzer, MC, USNR, Medical Service.

sumably, were alcoholics, although in the case of the physician, the summary states only that an excessive alcoholic intake occurred in the few months prior to his final admission. It is likely that his alcoholic intake was excessive over a longer period of time.

Both patients had had two previous hospital admissions because of difficulties encountered in diabetic management and, what seems more significant, evidence primarily of liver dysfunction and its complications dominating an otherwise not so severe diabetic picture.

The major was first admitted for treatment of cirrhosis, and at that time multiple transfusions were necessary for massive gastro-intestinal bleeding, presumably from esophageal varices. A departure from diabetic management and an associated respiratory tract infection were the reasons for the second hospitalization. Ascites was found at that time.

The physician's first recorded hospitalization resulted in the initial discovery of his diabetes. Associated findings at that time were not only the usual symptoms and pathology of diabetes, but also hepatomegaly, moderate hypertension, "hemosiderosis" of both legs, and dependent edema. There was a past history of mesenteric thrombosis following thrombophlebitis of leg varicosities and ulceration some 12 years before. I am not quite sure that mesenteric thrombosis and thrombophlebitis of the leg are significant in relation to his diabetes. Perhaps they complicated an attack of pancreatitis.

His next admission, a year later, again was because of neglectful management of his diabetes, and at that time a rather severe state of diabetic acidosis developed. However, just as important at that time was the finding of persistent hepatomegaly; ascites had developed, and liver function studies indicated serious hepatic impairment.

On their terminal admissions both patients were comatose, both having become so only a short time prior to being brought to the hospital. The duration of the major's coma was a matter of only an hour or so. On the day prior to his last admission he had complained of general malaise, and a few hours before admission he fell in his room, became semicomatose, and did not respond after he was given some orange juice as advised by his doctor. When he was admitted, peripheral vascular collapse was evident, and he was dehydrated and deeply comatose. Ten per cent dextrose was started shortly before blood for sugar determination was drawn. The result of that determination was 204 mg per 100 ml. There was no clinical improvement and even though stimulants and vasopressor agents were administered, he died promptly.

This is to be considered a rather sudden and rapid demise even for a careless diabetic. That he had serious liver disease there can be no doubt, and with poor nutritional history and excessive alcoholic intake progression was to be expected. Perhaps there is no deadlier combination than diabetes and embarrassment of liver function. Since the liver figures importantly in carbohydrate metabolism and maintenance of a

constant blood sugar level, cirrhotics are extremely prone to insulin shock. Storage and release of glycogen by the liver require insulin, and in a poorly functioning or fatty liver a deficiency in this function develops since there is no place to put this important sugar. It is not hard to conceive of a rapid infusion of dextrose, even for a minute or two, raising the blood sugar to 200 mg per 100 ml, especially since it could not have had time to become evenly distributed throughout the extracellular fluid. Therefore I think it is most likely that this patient died of insulin shock. Although there was a history of a fall and possible head injury, and areflexia found on admission suggested the possibility of intracranial hemorrhage, it would be hard to distinguish between central nervous system embarrassment by massive hemorrhage and its embarrassment by deprivation of necessary nutrition. Injury to the chest at the time he fell should be considered, for this might have initiated another massive esophageal hemorrhage, but except for the profound shock there is nothing noted that would lend credence to this.

The physician, I feel, presented a different problem on his final admission. He had become jaundiced two weeks prior, and there was massive ascites and evidence of renal failure. In addition, his demise was not nearly so rapid; he remained comatose about one week before death. Insulin shock or diabetic acidosis do not seem to have been involved, for control of his diabetes was apparently maintained, at least according to repeated blood sugar determinations. I believe that the greater part of the evidence points toward cholemia or perhaps the so-called hepatorenal syndrome. The presence of cholemia is difficult to prove clinically, for it has been stated that there are no specific findings, except laboratory findings of hepatic failure, that enable one to distinguish between hepatic coma and any other form of coma. These laboratory evidences do not necessarily show any marked change when a patient passes from a state of moderate hepatic dysfunction to what is known as cholemia. Because jaundice need not be present and neurologic findings are not constant, this is largely a diagnosis of anticipation.

Several things are mentioned in the summary which make one think of a basis for concomitant diabetes and liver failure in this patient. The history of chronic dry, scaly skin and hemosiderosis of both legs are frequent findings in hemochromatosis or bronze diabetes. But usually the diabetes is much more severe and requires more insulin for control than was necessary in this patient. The "hemosiderosis" is probably explained on the basis of incompetence and stasis in the veins of the legs, though hemosiderin deposition in the skin is not necessarily a constant in hemochromatosis. Organ involvement is the paramount manifestation. The development of jaundice and discovery of a very large, nodular, hard liver might suggest hepatic malignancy, which also is not too uncommon in hemosiderosis; the incidence is from 10 to 15 per cent.

I feel that, even though a normal blood sugar was found, the first patient died of hypoglycemia in the presence of diabetes and cirrhosis.

The second patient's final episode, I believe, was cholemia and/or "hepatorenal syndrome" resulting in coma—possibly on the basis of hemochromatosis or hepatic malignancy; but I will just stick to cirrhosis.

**Dr. Critzer's diagnoses:**

*Case 1.* Hypoglycemia with presence of diabetes and cirrhosis

*Case 2.* 1. Cholemia and/or "hepatorenal syndrome" in the presence of cirrhosis  
2. Diabetes mellitus

**PATHOLOGIC FINDINGS**

Doctor Pierce: Clinically, both of these men had diabetes and cirrhosis, and at autopsy both had large, cirrhotic livers. The liver of the first patient weighed 3,160 grams, and of the second, 3,850 grams. The incidence of the combination of diabetes and cirrhosis reported in the recent literature varies considerably—from less than 1 per cent to 24 per cent. Adhering to the concept that diffuse hepatic fibrosis develops as a reaction to the accumulation of some substance within the cytoplasm of the hepatic cells, which results in interference with the intra-lobular circulation and leads to malnutrition and degeneration of the parenchyma,<sup>1</sup> and that this is demonstrated in glycogen disease, adult Gaucher's disease, xanthochromatosis, Niemann-Pick disease, and occasionally in amyloid disease, we would expect the incidence to be high. One of the first experimental observations on diffuse hepatic fibrosis was that it developed in depancreatized dogs. That its development in such dogs can be prevented fairly well by adequate therapy with insulin and diet has been shown.<sup>2</sup> The descriptions of the livers of diabetics in the pre-insulin days frequently mentioned that they were cirrhotic or fatty. Generally good management of diabetes probably accounts for the present less-frequent occurrence of the combination. This is reflected in the reports in the literature; the highest incidence is reported from hospitals and clinics where good control of diabetes is not possible. Conversely, a damaged liver may cause disturbances of blood sugar levels, including hyperglycemia. Whether or not this type of hyperglycemia can be called diabetes mellitus depends, as pointed out by Spellberg,<sup>3</sup> on the definition of diabetes, but when it occurs in patients with diabetes, it may complicate this disease severely. Hypoglycemia as a result of liver damage, on the other hand, may result in apparent improvement in a diabetic. The ease of control of the disease in the two patients discussed today, especially terminally in the second, may well have been due to the concomitant cirrhosis.

In the first patient, bleeding from the gastro-intestinal tract had occurred at least once prior to the last admission to the hospital. Definite esophageal varices were not noted at autopsy, but there was a small, active ulcer on the posterior wall of the duodenum. The role of portal hypertension as a cause of peptic ulcer has been stressed by

Palmer.<sup>4</sup> From his gastroscopic observations in cirrhosis, he thought that both ischemia, as governed by shunting of arterial blood away from the mucosa, and plethora, incident to portal hypertension, may lead to mucosal hypoxia and the development of erosions. There is no doubt that esophageal varices are the most usual source of bleeding in gastrointestinal tract hemorrhage occurring in cirrhosis of the liver, but peptic ulcers, especially superficial ulcerations, occur in numbers significant enough to indicate that there is a causal relationship, and that the assumption that bleeding in patients with alcoholism is from esophageal varices is dangerous.

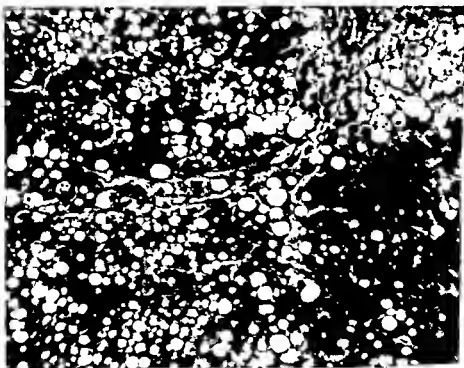
The influence of diabetes as a cause of peptic ulcer is less clear. In most clinics, the reported incidence is very low. Palmer, in discussing drugs and gastric mucosal injury, included insulin among the drugs that produce such injury, and he cited work done by Hanke,<sup>5</sup> who found that high parenteral doses of insulin caused distinct macroscopic and microscopic mucosal alterations in eight of 10 cats. Acute erosions occurred throughout the stomach, especially in the distal portion. The distal esophagus and proximal duodenum were also involved. One reason, of course, for a low incidence of peptic ulcers in diabetics is the fairly frequent finding of achlorhydria, as was found in 32.8 per cent of 399 diabetics studied by Joslin and associates.<sup>6</sup> This number, at least, can be considered as not being candidates for peptic ulcer. In a study of hypoglycemia in relation to duodenal ulcer, Beck<sup>7</sup> studied 96 patients to ascertain if there might be a greater incidence of hypoglycemia among patients with roentgenographically proven duodenal ulcer, and therefore with an increase of free hydrochloric acid, than in a control group. There were 47 in the group with duodenal ulcer who had free hydrochloric acid; of this number 51 per cent had hypoglycemia (70 mg per 100 ml or less). Forty-nine patients had no ulcer but had symptoms mimicking ulcer. Forty of these had free hydrochloric acid, nine had achlorhydria; five (12.5 per cent) with free hydrochloric acid had hypoglycemia. None of those with achlorhydria had hypoglycemia. If the hypoglycemia in persons with peptic ulcer is related to disturbed insulin secretion, namely, hyperinsulinism, we might infer that overzealous therapy with insulin or, again, poor regulation of insulin dosage might be important factors in the cause of ulceration of the stomach in diabetes, and especially if cirrhosis of the liver and portal hypertension are also present.

Disturbed gallbladder function was present in both of these men. In the first, there was atresia of the cystic duct with atrophy of the gallbladder, and in the second there was cholecystitis and cholelithiasis. There is a high incidence of diabetes in biliary tract disease due to infection, calculosis or functional obstruction.<sup>8</sup> Either may result in diabetes mellitus, pancreatitis, or in both, or at least in pancreatitis followed by diabetes. The cholecystitis and cholelithiasis probably accounted for the frequent attacks of abdominal pain in the second patient.

The immediate cause of death in the first patient was hemorrhage. However, the bleeding was not from any portion of the gastro-intestinal tract. The ulcer, which has been mentioned, showed no sign of recent bleeding. When this man stumbled and fell, the 10th, 11th, and 12th ribs on the left side were fractured, and the fractured ends lacerated the spleen. That hypoglycemia might have accounted for his stumbling as he attempted to make his way to the bathroom cannot be denied, for as Doctor Critzer has stated, the finding of a normal blood sugar after the patient had arrived at the hospital and dextrose had been started intravenously is no assurance that he did not have hypoglycemia.

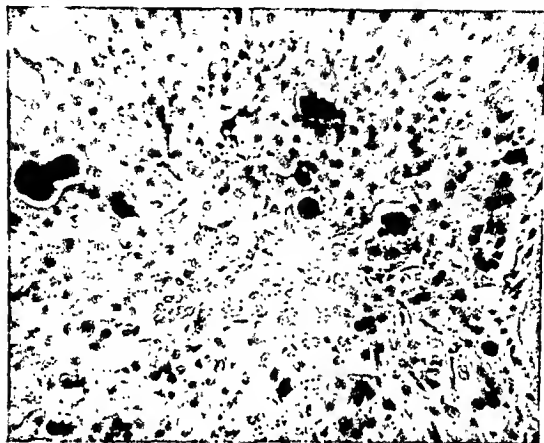
In the second patient, as in the first, the complication of alcoholism was undoubtedly a potent factor in the inadequate management of his diabetes. There were no gross ulcerations of his esophagus or stomach, but there were large esophageal varices and multiple petechiae of the gastric mucosa and of the mucosa of the small bowel. In addition to his cholecystitis and cholelithiasis, there was a chronic pancreatitis. In the major's pancreas, there was an apparent decrease in the actual number of islets, and in the islets seen there were varying degrees of degenerative change—hyaline degeneration or active fibrosis.

The gross diagnosis of cirrhosis was confirmed microscopically in the livers of both men. In addition to the scarring, there was some degree of fatty metamorphosis in both (fig. 1). The complicating biliary



*Figure 1 (case 2). Section of liver showing fibrosis extending into pseudolobules and fatty metamorphosis.*

tact disease in the doctor's liver is evidenced by bile stasis in the canaliculi and by the very marked bile duct hyperplasia (fig. 2). Both



*Figure 2 (case 2). Section of liver showing bile plugging of canaliculi.*

of these occur in portal cirrhosis, but usually not to this degree. The over-all pattern of changes in this liver are those of portal cirrhosis (fig. 3), and the changes are interpreted as portal cirrhosis with complicating biliary tract disease. The latter occurred late, it would appear, after the portal cirrhosis was well established. Both men had some degree of arteriosclerotic heart disease. The kidneys of both men showed a mild to moderate degree of change due to arteriosclerosis, and in the second patient there also was bile nephrosis. The doctor had grade II to III arteriosclerosis of the cerebral arteries, and an incidental finding of interest was a latent carcinoma in his prostate gland.

**Pathologic diagnoses:**

*Case 1.*

1. Traumatic laceration of spleen with exsanguination into peritoneal cavity
2. Fracture, simple, complete, left ribs 10, 11, and 12
3. Cirrhosis, liver (diffuse hepatic fibrosis)
4. Diabetes mellitus, clinical
5. Degenerative changes and/or fibrosis, pancreatic islets
6. Peptic ulcer, duodenum



## Case 2.

1. Cirrhosis, liver (diffuse hepatic fibrosis) with generalized icterus
2. Diabetes mellitus, clinical
3. Cholecystitis and cholelithiasis and intrahepatic biliary tract disease
4. Pancreatitis, chronic and minimal, acute
5. Arterial and arteriolar nephrosclerosis and bile nephrosis



Figure 3 (case 2). Section of liver showing dense portal fibrosis and bile duct hyperplasia.

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## LIMITING DEFECTS OF ARMY INDUCTEES IN PHYSICAL CATEGORIES B AND C

BERNARD D. KARPINOS, Ph. D.  
GRACE SOUTHER

**I**T HAS been an established procedure in the Army since 1944 to profile each individual at the time of his physical examination for military service. The primary objective of the profiling has been to evaluate, on the basis of the physical examination findings, the individual's physical capacity from a functional rather than from a diagnostic point of view. This is particularly important with respect to individuals found qualified for military service.

Initially, the profile system was established for the purpose of providing an adequate qualitative distribution of the available qualified manpower between the various armed services—a distribution which was very much unbalanced during World War II and which had placed the Army, particularly the Army Ground Forces, in a very unfavorable position.<sup>1</sup> In addition, however, the profiling system aimed at a second, not less important, function; namely, assessing the individual's ability to perform particular military duties.<sup>1,2</sup>

The profiling has been accomplished by appraising the individual's functional capacity in terms of the well-known PULHES factors, which symbolize the following:

**P**—Physical capacity or stamina: Organic defects, age, build, strength, stamina, height, weight, agility, energy, muscular co-ordination, and similar factors.

**U**—Upper extremities: Functional use, strength, range of motion, and general efficiency of hands, arms, shoulder girdle, and spine (cervical, thoracic, and lumbar).

**L**—Lower extremities: Functional use, strength, range of motion, and general efficiency of feet, legs, pelvic girdle, and lower back (sacral spine).

**H**—Hearing (including ear defects): Auditory acuity as well as organic defects.

TABLE 2. *Per cent distribution of U. S. Army inductees in physical categories B and C, by limiting defects and race (1953-1954)*

—Continued—

Defects	Physical category B			Physical category C		
	Total (%)	White (%)	Negro (%)	Total (%)	White (%)	Negro (%)
Genito-urinary system diseases	0.5	0.5	0.8	0.3	0.3	0.3
Hydrocele	0.1	0.1	0.2	0.1	0.1	0.0
Other	0.4	0.4	0.6	0.2	0.2	0.3
Skin and cellular tissue diseases	1.2	1.2	0.9	1.2	1.2	0.7
Acne vulgaris	0.4	0.5	0.1	0.4	0.4	0.0
Other	0.8	0.7	0.8	0.8	0.8	0.7
Bones and organs of movement, diseases and defects	31.6	29.9	52.1	20.4	20.0	28.4
Osteochondritis	0.3	0.4	0.1	0.4	0.4	0.1
Internal knee derangement	0.6	0.6	0.3	1.1	1.1	0.9
Sacro-iliac joint affection	0.2	0.2	0.0	0.3	0.3	0.1
Diseases of the joint	1.1	1.1	0.5	1.4	1.4	0.9
Curvature of spine	1.2	1.2	1.1	1.0	1.0	1.3
Flatfoot	20.2	18.4	42.9	7.2	6.8	13.9
Clubfoot	0.8	0.9	0.2	0.7	0.7	0.9
Hammer toe	0.2	0.2	0.4	0.1	0.1	0.2
Shortening of lower extremity	0.2	0.2	0.1	0.4	0.4	0.5
Amputation of fingers	1.0	0.9	1.3	0.9	0.9	1.4
Limitation of motion	1.9	1.9	1.9	2.4	2.4	3.4
Deformities or impairments	2.5	2.5	2.0	2.4	2.5	2.1
Other	1.4	1.4	1.3	2.1	2.0	2.7

TABLE 2. *Per cent distribution of U. S. Army inductees in physical categories B and C, by limiting defects and race*  
 (1953-1954)  
 —Continued

Defects	Physical category B			Physical category C		
	Total (%)	White (%)	Negro (%)	Total (%)	White (%)	Negro (%)
Congenital malformations	0.7	0.7	0.9	2.1	2.0	2.4
Undescended testicles	0.2	0.2	0.5	1.0	1.0	1.1
Other	0.5	0.5	0.4	1.1	1.0	1.3
Miscellaneous diseases and defects	8.1	8.1	7.6	8.3	8.2	9.8
Underweight	2.5	2.4	3.3	3.6	3.5	5.2
Overweight	2.3	2.4	2.1	2.0	2.0	2.4
Other	3.3	3.3	2.2	2.7	2.7	2.2
Population bases	57,809	53,334	4,475	38,903	36,869	2,034

It may be noted from the latter table that eye defects, diseases and defects of bones and organs of movement, and psychiatric disorders were the predominant limiting defects. Inductees with such defects comprised about 75 per cent of all inductees in both categories B and C. Refractive errors and defective vision were the most prevalent diagnoses among the eye defects, while the disease defects of the bones and organs of movement consisted mainly of "flatfoot." The psychiatric disorders were primarily psychoneuroses. In view of the large frequencies of these defects, the standards governing the profiling of these particular defects are given below:

### *Vision*

Grade 2: Meets acceptable standards and his visual acuity will not be less than 20/200 in each eye correctible to 20/40 in each eye, provided the defective vision is not due to active or progressive organic diseases.

Grade 3: Meets acceptable standards with a minimum vision of 20/400 in each eye, correctible to 20/40 in one eye and 20/70 in the second eye, or 20/30 in one eye and 20/100 in the second eye. This classification also includes those individuals with any degree of defective vision in one eye from below 20/400 to no light perception if such defective vision is not due to active or progressive organic disease and if vision in the other eye is not less than 20/100 correctible to 20/20 with glasses.

### *Flatfoot*

Flatfoot, as in the case of other defects of the lower extremities, is to be graded 2 if it does not prevent moderate marching, climbing, et cetera, or prolonged effort. It is to be graded 3 if it causes moderate interference with functions but allows sustained effort for short periods.

### *Psychiatric Disorders*

Grade 2: Mild transient psychoneurotic reaction. Mild character and behavior disorders. Borderline mental deficiency.

Grade 3: Mild chronic psychoneuroses. Moderate transient psychoneurotic reaction. Mental deficiency, mild degree. History of transient psychotic reaction.

Eye defects were most prevalent among white inductees; flatfoot was most prevalent among Negro inductees.

## GENERAL PHYSICAL EVALUATION

For the general evaluation of the physical fitness of the inductees it seems important to relate the inductees with the most prevalent limiting defects to all inductees (categories A, B, and C), as done in table 3. This table indicates, for instance, that of

TABLE 3. *Number of inductees per 1,000, by race, with selected limiting defects (grades 2 and 3) (1953-1954)*

Most prevalent limiting defects	Number per 1,000 inductees							
	Grade 2			Grade 3			Grades 2 and 3	
	Total group	White only	Negro only	Total group	White only	Negro only	Total group	Negro only
Eye defects	56	60	23	46	50	19	102	42
Diseases and defects of bones and organs of movement	50	48	61	21	22	16	71	77
Psychiatric disorders	15	16	9	10	11	5	25	14

each 1,000 white inductees, 110 individuals (or 11 per cent) had eye defects (60 had an eye defect graded 2 and 50 had an eye defect graded 3), and that of each 1,000 Negro inductees, 77 individuals (or about 8 per cent) were graded 2 or 3 because of defects of bones and organs of movement, primarily flatfoot. It is worth noting that, although the latter defects were predominant among Negroes, in the total evaluation the proportion of Negro inductees with such defects was not much higher than that of white inductees; that is, 8 per cent among Negro inductees as compared with 7 per cent among white inductees. This is due to the fact that there are relatively fewer Negro than white inductees in categories B and C (table 1).

There were comparatively fewer Negro inductees with eye defects, both on a proportionate basis (table 2), and on an absolute basis (table 3).

The data indicate that about 2.5 per cent of the inductees were diagnosed as having some psychiatric disorder, nondisqualifying under the present psychiatric standards. It should be noted that the psychiatric requirements were lowered after World War II.<sup>4</sup>

There are no comparable diagnostic data, as presented in table 2, for enlistees profiled as physical category B or C. It seems, however, that it would not be unreasonable to assume that their diagnostic distribution is likely to be basically the same as those of inductees, though the enlistees differ from the inductees in their proportional distribution by physical category, as indicated above (table 1). Presumably, the diagnostic distributions given in table 2 may be taken as essentially representative of categories B and C of all accessions—enlistees and inductees.

#### SUMMARY

Based on the PULHES profiling system established by the Army in 1944, all individuals entering the military service are classified in terms of physical categories A, B, and C. This classification is an evaluation of the individual's physical capacity from a functional rather than a diagnostic point of view. Physical category A represents over-all physical capacity above the average, with no physical or minimal physical defects; category B represents over-all average capacity, involving some mild (nonprogressive) physical defects; category C indicates physical capacity below the average, with moderate (borderline) physical defects. These nondisqualifying defects of categories B and C are referred to as "limiting defects."

Separate distributions by physical categories A, B, and C, covering the 1953-1954 period for inductees and voluntary enlistees, indicate that the enlistees have a more favorable per cent distribution than the inductees; i. e., 81:12:7 for enlistees vs. 74:16:10 for inductees in categories A, B, and C, respectively.

A diagnostic distribution of the limiting defects of the inductees in physical categories B and C, obtained for the 1953-1954 period, indicates that these were predominantly eye defects, with refractive errors and defective vision being the most prevalent diagnoses; diseases of the bones and organs of movement, consisting mainly of flatfoot; and psychiatric disorders, primarily psychoneurosis.

Racial differentials were found in both the distribution by physical category and the diagnostic breakdown of the limiting defects.

No comparable diagnostic distribution was available for enlistees. It may be assumed, however, that their limiting defects would in all probability be distributed by diagnosis in essentially the same manner as those of the inductees.

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#### DIABETES AND ISCHAEMIC HEART DISEASE

"At present more than two-thirds of the deaths among diabetics are caused by atherosclerosis, and in 70% of cases ischaemic heart disease is responsible. Moreover, two out of every five diabetics have clinical or electrocardiographic evidence of coronary ischaemia, and a quarter of these are under 40 years of age. The incidence of severe coronary sclerosis among diabetics coming to necropsy is approximately three times the figure for the general population. The frequency of angina is at first sight surprisingly low, until it is realized that more than half the diabetics who develop angina are dead within a year. Finally, the chances of survival after a myocardial infarct are two to three times worse than in a control group. No less than 60% of diabetics die within sixty days of the acute episode, only 16% are alive at the end of five years, and scarcely one survives longer than ten years."

—*British Medical Journal*  
p. 36, July 7, 1956



# HELICOPTER MOBILE MEDICAL COMPANIES

## In the Fleet Marine Force

JOHN E. WING, *Lieutenant, MC, USNR*  
JAMES A. ADDISON, *Commander, MC, USN*

**T**HE Fleet Marine Force (FMF) Medical Service was designed some two decades ago to provide medical support for the amphibious assault, an untested combat concept pioneered by the United States Marine Corps. It received its baptism in the victorious assaults of World War II.

With the detonation of atomic bombs over Hiroshima and Nagasaki and subsequent developments in the family of atomic weapons, the amphibious technic has been the subject of searching re-examination. In the last decade, triphibious assault or vertical envelopment, as a countertactic, has become pre-eminent. It is based on the capability of the transport helicopter to provide tactical mobility, surprise, and dispersion.<sup>4</sup>

To perform the medical mission in triphibious assault, the First Medical Battalion of the First Marine Division instituted experiments in 1955 to revise thinking and planning for future medical support. This revision was necessary after envisioning combat teams with helicopter mobility which would operate over widely dispersed areas and be subject at all times to dissolution into mass casualties. As a facet of this examination, it was decided to test the practicability of mobilization by helicopter of entire medical collecting and clearing companies.

### THE FMF COLLECTING AND CLEARING COMPANY

The medical battalion of a Marine division consists of a headquarters and service company, two 100-bed hospital companies, and three collecting and clearing companies. The latter are unique to the FMF Medical Service. They are responsible not only for collecting and sorting casualties from battalion aid stations in the regimental zone of action, but also for performing emergency lifesaving surgery in their 60-bed hospitals.

The table of organization of a collecting and clearing company is shown in figure 1. For conventional amphibious operations,

from First Medical Battalion, First Marine Division, FMF, Camp Pendleton, Calif.

it is staffed by 4 Navy medical officers, 70 hospital corpsmen, and 22 marines. Its basic medical equipment weighs 12,768 pounds, in addition to the 10-day initial resupply block weighing over 3 tons. It is provided with 1 surgical trailer, 3 utility vehicles, 5 field ambulances, and 3 jeep ambulances.

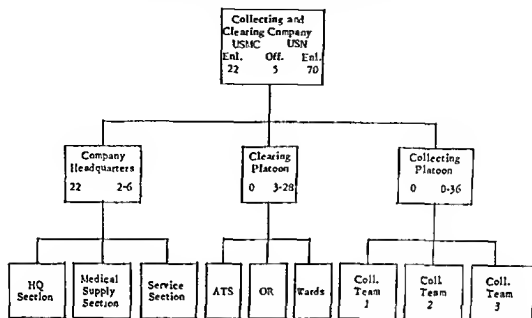


Figure 1. Table of organization of Fleet Marine Force collecting and clearing company.

In the fluid situation of highly mobile triphibious warfare, medical elements operating in support of ground combat teams must possess flexibility of organization, the capacity to incorporate needed additional support elements (shock teams; surgical teams; atomic, biologic, chemical warfare defense and decontamination teams; and preventive medicine teams) and the ability to extrude elements capable of semidetached functioning which may be vitally needed elsewhere. The FMF medical collecting and clearing company is such a unit. Medical elements must also possess the ability to respond smoothly and rapidly with attendant medical equipment to swiftly changing tactical situations. In combat involving the use of atomic weapons by both sides, the ability to airlift on an hour's notice to an area possibly denying entrance by surface vehicle but requiring its services is of the highest import.

#### THE TRANSPORT HELICOPTER AND DEPLOYMENT OF MEDICAL COMPANIES

At the time of the Korean campaign, when the concept of vertical envelopment was in its inception, the helicopter demonstrated its value in uses ranging from artillery observations to switching entire battalions on the front line, giving evidence from the first

that it represented a major advance in combat. The medical services of both field forces promptly utilized this work horse for evacuation of casualties from the front lines.

Experiments in heli-lifting medical collecting and clearing companies were performed with the admittedly inadequate Sikorsky transport helicopters (HRS) 1 and 3. The limitations imposed on a medical company evolved around the lift capability of this interim transport helicopter, which was from 700 to 1,000 pounds over and above its two-man crew and fuel. Factors such as the temperature of the air, the height above sea level, the level of fuel remaining, the length of flight time, and the condition of the helicopter all entered into any computation of the payload.

Only equipment falling within the lift capability of the HRS as to weight, size, and density could be considered, eliminating all vehicles, 9-kv generators, and shower units. Of the equipment thus eliminated, only the 9-kv generator was critically needed for functioning of the clearing platoon. Substitution of the presently used generators by smaller ones weighing about 250 pounds and capable of providing current for operating-room illumination, suction, and refrigeration would have made it possible to heli-lift the necessary equipment.

Flexible lift priorities for men and equipment were established so that admission, triage, and shock-team equipment and personnel could be functional while other elements were being shuttled in. Equipment loads were prepalletized and arranged so that helicopters could load either internally (fig. 2) or for external lift (fig. 3).

In the first pilot exercise, the assigned medical company minus its 10-day supply block and its vehicles was airlifted by 6 HRS-1 type helicopters provided by Marine Helicopter Transport Squadron 363 (HMR-363), El Toro, Calif., to a site 6 air miles away within 1 hour and 31 minutes from initiation of flight to termination. Forty-five helicopter lifts were required for this particular exercise. Within one hour after the lifting of first priority equipment and personnel, the admission, triage, and shock team was functional. The operating-room team was functional within 2½ hours after the lift commenced; ward teams, within 3 hours; and galleys equipment for feeding patients, within 3½ hours.

In a similar exercise in a tactical desert situation at Marine Corps Training Center, 29 Palms, Calif., an entire medical collecting and clearing company complete to its 10-day resupply block but minus its vehicles, was heli-lifted 10 air miles by 6 helicopters of the HRS-3 type (HMR-362) and was functional within 3 hours.



*Figure 2. Hospital corpsmen loading field autoclave aboard HRS helicopter.*



*Figure 3. HRS-3 (H-19) hovering prior to the external lifting of medical equipment of a collecting and clearing company being belilifted forward.*

The medical company, resupplied by helicopter, is potentially capable of receiving casualties from surface vehicles in the area or brought in by reconnaissance helicopters, and of evacuating via transport helicopters the casualties within its zone of action who require further treatment.

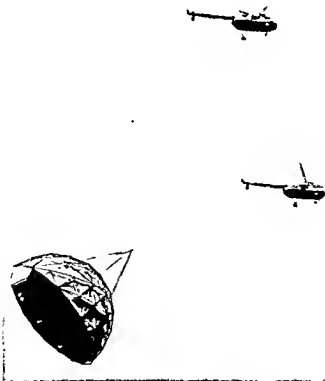
Concomitant with the development of larger helicopters, studies are underway aimed at lightening medical equipment and decreasing the time required for establishing medical functions. The recent report of Storer and Krebs<sup>2</sup> on the development of radiothulium portable x-ray equipment for use in field hospitals is an example of this effort. The adaptation of the lightweight "Mity-Mite" and "Mule" ns ambulances will further increase the potentiality for total heli-lift of medical units (figs. 4 and 5).



Figure 4. Marine HRS helicopter lifting "Mity-Mite." This light-weight vehicle can be converted into an ambulance.



*Figure 5. Hospital corpsmen evacuating casualty from front line to battalion aid station in the "Mule," lightweight vehicle.*



*Figure 6. A 42-foot diameter geodesic dome being transported by two HRS type helicopters. This shelter can, with modifications, serve as triage or operative area.*

Evaluation has been made within this battalion of adapting preassembled geodesic domos, which can be lifted by two HRS type helicopters (fig. 6), to use as triage, ward, and surgical areas in place of field tents. Continuing experiment along these lines, to adapt medical organizations to developing helicopter mobility, may result in potentially useful technics.

### SUMMARY

A Fleet Marine Force medical collecting and clearing company has been expeditiously moved by the presently used helicopter (HRS). The helicopter is visualized not only as a rapid means of casualty evacuation, but also under certain tactical situations as an essential agent for increasing the mobility of medical units.

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### THE PROBLEM OF NUCLEAR INDUSTRY

"Radioactive wastes from reactors must be segregated or diluted to tolerable concentrations. At present, underground storage and ocean burial are among the methods used or proposed for segregation. Both the economy and the adequacy of these methods are under continuing investigation in anticipation of the probable increase in volume of radioactive wastes.

"It is estimated that nuclear power plants completed during 1964 alone will have a power level exceeding  $2.25 \times 10^6$  kilowatts, producing wastes each year of  $3.3 \times 10^{12}$  gallons containing 10 millicuries per gallon. An indication of the magnitude of this activity is that the entire flow of the Mississippi River would not be sufficient to dilute to permissible concentrations the fission products from these plants. Such a method of dilution, of course, is obviously least likely to be used.

—Public Health Reports  
p. 611, June 1956





the anterior abdominal wall, or air in the region of the right kidney.<sup>2</sup>

**Treatment.** Immediate diagnosis and surgical intervention is imperative for such a condition. After attempts at correcting shock and electrolyte deficiency, if present, laparotomy should be performed. Retroperitoneal ruptures can easily be overlooked, even with mobilization of the entire duodenum, and should therefore be searched for. Following closure of a retroperitoneal rupture, retroperitoneal drainage should be afforded.

Supportive postoperative therapy in the form of replacement electrolytes, whole blood transfusions when necessary, and antibiotics will decrease the heretofore high mortality of duodenal rupture.

**Mortality.** The mortality rate has progressively improved. In 1910, Guibé<sup>3</sup> reported a 90 per cent mortality in 134 cases. In 1940, Hinton<sup>4</sup> reported a 45 per cent mortality in 84 cases. In 1949, Siler<sup>2</sup> reported a 20 per cent mortality in 25 cases. Since then there have been isolated cases reported with no mortalities. Certainly with prompt diagnosis and immediate reparative surgery, the mortality in this type of injury can be kept to a minimum.

#### SUMMARY

Traumatic rupture of the duodenum is a fairly uncommon but well-known entity. The case presented is unique in two aspects: (1) It is believed to be the first reported of complete transverse division of the duodenum caused by nonpenetrating trauma; and (2) the patient is believed to be the youngest reported in the literature, to have been treated successfully for traumatic rupture of the duodenum.

The most common site of rupture is in the relatively fixed portions of the duodenum. Signs and symptoms depend on whether the rupture is into the peritoneal cavity or into the retroperitoneal space. If the rupture is intraperitoneal, the signs and symptoms are those of acute peritonitis. A retroperitoneal rupture may produce a less stormy course with varying degrees of pain, fever, and leukocytosis.

Prompt diagnosis, correction of shock and electrolyte imbalance, and early surgical repair of the rupture will decrease the high mortality of this condition.

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# Pituitary Ependymoma

SARKIS S. SARKISIAN, *Commander, MC, USN*  
ARTHUR L. SCHULTZ, *Captain, MC, USN*

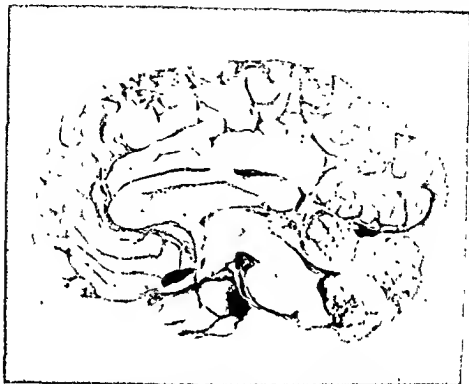
**E**PENDYMOA of the pituitary gland is not generally recognized as a primary lesion and a case is presented below which is considered by us to be a primary ependymoma of the pituitary gland. According to Kernohan and Sayre,<sup>1</sup> intracranial ependymomas are the second most common type of gliomas, occurring on an average between 23 and 24 years of age. In their series, 40 per cent of the ependymal tumors were located supratentorially and 60 per cent infratentorially. Of the latter, 90 per cent occurred in the midline and involved the fourth ventricle or cisterna magna. Antoni<sup>2</sup> proposed that gliomas of the pituitary can arise as ependymomas from the neurohypophysis and stalk. All tumors in this region, then, are not of primary pituitary gland derivation. In fact, Antoni believed that the preponderance of these tumors are ependymal gliomas. Although, anatomically, ependymal lining cells dip into the infundibulum of the pituitary, as illustrated in figure 1, and can conceivably give rise to an ependymoma, there is a remarkable absence of such cases documented in the literature. The question of how often ependymomas of the pituitary occur can be elucidated to some degree by re-examination of tumors of this area and correlation with other applicable information, such as case history and operative or autopsy findings. An organization such as the Armed Forces Institute of Pathology might have material available for such a study.

## CASE REPORT

The patient was a 31-year-old woman who after a normal pregnancy three years earlier had amenorrhea and intermittent lactorrhea. Eight months prior to admission she observed blurred and hazy vision in the left eye associated with photophobia. Two months prior to admission she noted that she was almost blind in the left eye.

The physical examination was negative except for visual field studies which revealed a marked restriction of the visual fields on the left side compatible with the pattern of a bitemporal hemianopsia. The impression was primary optic atrophy due to a chiasmal tumor. Roentgenograms of the skull revealed the pituitary fossa to be enlarged with erosion

of the posterior clinoid processes. These findings were considered to be suggestive of local pressure effect compatible with a pituitary tumor.



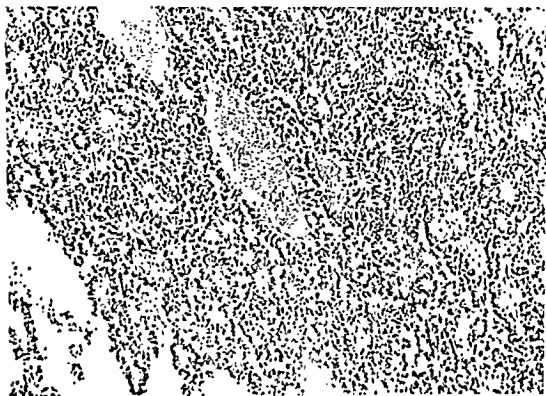
*Figure 1. Midline hemisection of a brain specimen, with pointer demonstrating ependymal reflection into pituitary stalk.*

On craniotomy a tumor mass was found to have compressed the left optic nerve. The tumor—gray-brown in color, soft, and friable—appeared to be arising from the pituitary gland, and much of the mass was removed. At this time, it was considered to be a chromophobe adenoma. The patient made an uneventful recovery with good visual improvement of the left eye.

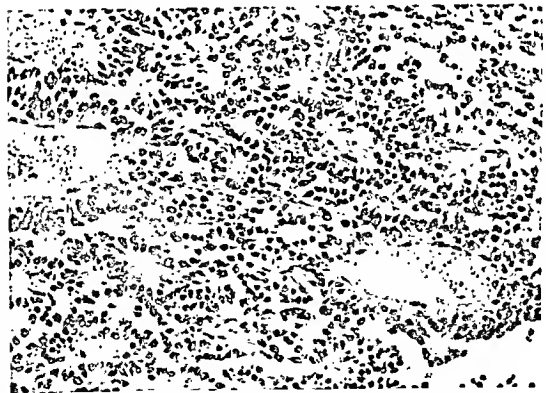
#### DISCUSSION

It is evident that, although anatomically likely, ependymomas of the pituitary gland are infrequently documented.<sup>3-5</sup> In such a case of intracranial neoplasm certain pathophysiologic conditions may be expected due to local mechanical pressure on the optic nerve and pituitary gland. Thus, in the case which is presented above, there are the usual changes associated with hypopituitarism, such as amenorrhea.

The microscopic findings in the tumor (figs. 2 and 3) reveal a characteristic histologic appearance of an ependymoma, consisting of spinal cells with abundant cytoplasm arranged in rosettes and pseudorosettes and radially around vascular channels.



*Figure 2. Low-power view of pituitary tumor. ( $\times 100$ )*



*Figure 3. High-power view of pituitary tumor, revealing characteristics of an ependymoma. ( $\times 240$ )*

It would appear that not only are pituitary ependymomas to be expected from an anatomic standpoint but that they also exist clinically.

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#### HYPOTENSION FROM RAUWOLFIA DURING ANESTHESIA

"Hypertensive surgical patients on Rauwolfia therapy have shown significant hypotension and bradycardia during anesthesia. . . . This appears to be a vagal response enhanced by the vagotonic anesthetics and corrected by the use of vagal blocking drugs.

"Patients on Rauwolfia therapy who are to undergo elective surgery should not receive this drug for two weeks prior to the surgical procedure. The hazards of removing the antihypertensive and tranquilizing effects of these drugs must be considered before discontinuing therapy prior to a surgical procedure. Emergency surgery on these patients may be safely carried out by using vagal blocking drugs to prevent and treat vagal circulatory responses.

—CHARLES S. COAKLEY, M. D.  
SEYMOUR ALPERT, M. D.  
JOHN S. BOLING, M. D.  
in *The Journal of the American Medical Association*, p. 1144, July 1956

# Levarterenol in Cardiac Infarction

## With Shock and Transient Complete Heart Block

ARCHIBALD L. RUPRECHT, *Lieutenant, MC, USNR*

**I**NFARCTS of the heart causing A-V dissociation are often fatal. Reported here is a case of total block that lasted a week after infarction; during this period, adequate blood pressure was maintained only with the help of Levophed Bitartrate (brand of levarterenol bitartrate). The patient recovered, however, and even a year later cardiac symptoms were no more severe than prior to the attack. Now that hypotension and slow ventricular rates are more easily treated,<sup>1,2</sup> the prognosis in such cases may be better, many deaths being from the cumulative effect of several factors. Cardiac output declines as a result of the infarct, but is not to drop lower with onset of bradycardia so that hypotension is often severe.<sup>3,4</sup> If fever develops and greater minute output is called for, fixation of rate can be a separate handicap. Ischemia of the myocardium may become so marked as to impair function and favor more dire changes in rhythm.<sup>5</sup> As the following case suggests, this sequence need not occur regularly, and the often transient nature of the block should emphasize the opportunity for therapy.

### CASE REPORT

A 54-year-old white male nurse was admitted to the hospital in May 1954 because of substernal pain of 30 hours' duration, associated with nausea and a single emesis. He had had angina pectoris and mild hypertension for 5 years, with an average blood pressure of 170/90 mm Hg. The only other cardiac symptom was dyspnea on moderate exertion, present for 18 months.

On hospital entry, blood pressure was 128/78 mm Hg; heart rate, 82; respirations, 20; and oral temperature, 97.8°F. No signs of congestive failure were present. The heart was not enlarged to percussion, sounds were of good quality, and the rhythm was regular; a soft systolic murmur was heard just to the right of the manubrium, but the second sound was louder here than at the pulmonic region. Except for mild obesity, there were no other pertinent physical findings.

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From Swedish Hospital and the University of Washington School of Medicine, Seattle, Wash. Dr. Ruprecht is now at 750 Belmont North, Seattle 2, Wash.

Examination of the blood revealed a normal value for hemoglobin and a slight leukocytosis, a high percentage of neutrophils being the sole abnormality on smear. The urine was not remarkable. A serum test for syphilis was negative. An electrocardiogram a few hours after entry showed a sinus bradycardia of 50 and changes indicative of a fresh posterolateral infarct with a septal component. The key features were a deep Q wave and S-T segment elevation in lead III; the only notable finding in lead II was a diphasic T wave. In addition, S-T segments were high in leads aVR, aVF, and  $V_1$ , but low in leads I, aVL, and  $V_4$  through  $V_6$ , the depression being accompanied by T-wave inversion. Position of the heart was intermediate with moderate counterclockwise rotation. P-R and QRS intervals were of normal length, and though all ventricular complexes were slurred, evidence of left ventricular hypertrophy was lacking. A roentgenogram of the chest was not made at this time.

Strict bed rest and oxygen by nasal catheter were provided. Daily doses of phenobarbital were begun and also small doses of morphine as needed to relieve substernal pain. The patient's temperature rose 8 hours after admission to 101.6°F, the start of a marked febrile response that was to last nearly a week. Apart from chest pain and fever, however, the man's course during the first hospital day was uneventful.

The quality of the heart sounds deteriorated by the next morning, and toward midday the pulse rate was regularly around 55. An electrocardiogram at this time showed only typical changes of posterolateral infarction and complete A-V block. The form of the QRS complex was unchanged, indicating a nodal rhythm. The blood pressure began to fall faster and late that afternoon reached 94/60 mm Hg, the patient exhibiting signs of circulatory collapse: anxiety, pallor, and a cold sweat. Fine rales became audible over the lung bases, but other evidence of congestive failure did not develop.

The patient was in this critical state for almost 2 hours before an infusion was started containing 4 mg of Levophed Bitartrate per liter of 5 per cent dextrose in water. Administered at a rate of 20 drops a minute, this restored the patient to preshock status within half an hour. Penicillin was given as prophylaxis, oxygen by tent substituted for the nasal catheter, and in view of a bad prognosis, heparin sodium and Dicumarol (brand of bishydroxycoumarin) were begun.

The rate of flow of Levophed Bitartrate was adjusted to keep blood pressure at about 120/80 mm Hg. A pericardial rub was audible 36 hours after admission and persisted until the next afternoon, the day when some stability in the patient's condition became apparent. Chest pain was milder and less frequent, and in spite of the disposing factors, frank congestive failure was not present. Re-examination of the patient and a second urinalysis failed to disclose an infectious cause for the sustained fever. Penicillin was replaced by a broad-spectrum antibiotic, but the high temperature did not abate.

Late in the third day, the patient complained again of severe substernal pain when the pressor infusion stopped because a clot formed in the needle. There was ashen pallor, and blood pressure was 90/60 mm Hg, changes which proved quickly reversible when Levophed Bitartrate was restarted. This sequence was repeated the next night, and to avoid other similar episodes, a plastic catheter was inserted in an ankle vein. In the process, resumption of this therapy was delayed about two hours, and by then cardiac shock was more advanced. Blood pressure was not recorded lower than 90/60 mm Hg, but the patient was very restless and in a profuse sweat with blotchy cyanosis. Luckily, this deterioration was as easily halted as before.

These bouts of hypotension with each hiatus in therapy are graphed in figure 1. Premature beats were noted at these times, but serial electrocardiograms did not reveal extension of the infarct, showing only evolutionary changes and persistent complete block. The atrial rate was always about twice the ventricular rate of near 50, the form of the QRS complex remaining unchanged.

From the sixth day onward, the patient's course was more favorable as blood pressure was sustained with less Levophed Bitartrate, and both fever and chest pain subsided. Oxygen was continued, however, because the patient became slightly cyanotic if out of the tent for more than a few minutes. Further need for pressor infusion was tested now and then by reducing its rate of flow, the result always being a disturbing drop in blood pressure. The importance of this was substantiated on the eighth day when the patient, in a confused state probably due to barbiturate toxicity, pulled out the venous catheter. Though the full picture of shock did not follow, a marked pallor developed and blood pressure fell to the lowest level in three days (fig. 1). Rational behavior slowly returned once phenobarbital was withheld, and additional Levophed Bitartrate corrected the hypotension.

Eighteen hours after this episode, the ventricular rate rose spontaneously to between 80 and 90, this being the return of A-V conduction after a complete block. The P-R interval was prolonged for a time, but the continuous circulation was over and Levophed Bitartrate was stopped with difficulty, blood pressure stabilizing at 115/80 mm Hg. A total of 52 mg of Levophed Bitartrate had been given, and despite typical problems with its administration, there was no trouble from vasospasm near the sites of infusion. With improvement in cardiac function, antibiotic and oxygen therapy was also discontinued.

After three weeks, no abnormalities of the heart could be detected on physical examination, and a chest radiograph showed cardiac and aortic shadows of normal size and contour. Ambulation was begun and Dicumarol discontinued.

At the end of four weeks the patient left the hospital to begin a prolonged test at home. A year later, he reported the return of mild hypertension and persistent angina, but congestive failure had not



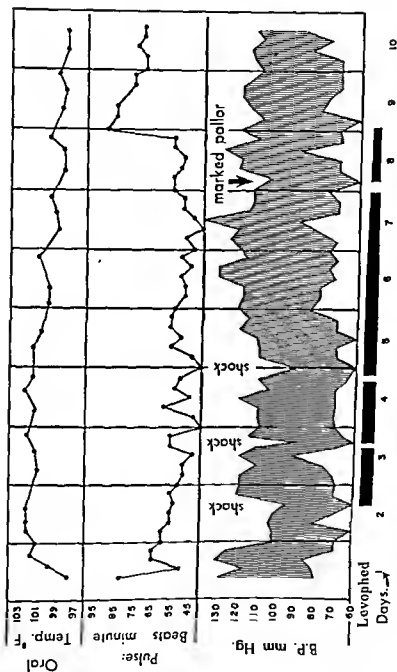


Figure 1. Graph of patient's clinical course showing inability to maintain an adequate blood pressure without Levophed Bitartrate during period of complete A-V block.

nor was there a history of peripheral embolus. He was working full time as a hospital nurse and described his physical limitations as very similar to what they were prior to infarction.

*Comment.* The crucial role of pressor therapy in the recovery of this patient seems clear. Blood pressure fell rapidly after onset of complete block, and only with Levophed Bitartrate was an adequate level maintained until A-V conduction returned a week later. Hypotension was never marked, but surely cardiac shock existed in view of the clinical picture and the previously high blood pressure. Only at times of circulatory collapse was irregularity of the heart noted, but in cases like this, ectopic beats are often numerous or herald a fatal arrhythmia if hypoxia is not relieved.

Despite the prolonged need for adjuvants, disability seemed the same after recovery, suggesting that much of the acute trouble was related to block. At that time the myocardium was ischemic from hypotension and less able to compensate for the infarcted and inert zone. In turn, low blood pressure was due to decreased systolic power and a slow, as well as fixed, ventricular rate. During the high fever, this rate was no greater than on the seventh and eighth days when the temperature was almost normal and less was demanded of the heart (fig. 1). Fixation of rate was thus an extra factor to limit output at a time when the best possible coronary flow was desirable; although impaired by both the old and fresh cardiac lesions, the stroke volume was being heavily relied on to sustain the circulation. In spite of mild congestive failure, better coronary flow as a result of the rise in blood pressure was enough to restore adequate ventricular function and permit recovery. The effect of Levophed Bitartrate in contracting the peripheral vascular bed probably made this easier. In the patient's favor were the anginal history and high location of the pacemaker, but these features do not detract from this example of the help a pressor agent can be at times.

### DISCUSSION

A statistical study alone can show if persons like this patient derive unusual benefit from pressor therapy. Though such benefits have been suspected by other authors, their comment has been brief.<sup>6</sup> This analysis is offered because a large series is hard to collect, yet cases are common enough to make the point of interest. Many articles report the value of Levophed Bitartrate in shock from a cardiac infarct, and the basis for a better prognosis in this material as a whole is granted.<sup>6</sup> Thus, attention is drawn only to patients in whom shock and A-V dissociation occur together and to the unique features they present.

Infarcts causing total block are often associated with a very low output, cardiac indexes of 1 and less being on record.<sup>4</sup> Gen-

erally, so small a value is expected only after a massive infarct or when there is diffuse fibrosis before the attack, cases where the prognosis correlates with the muscular deficit. When bradycardia contributes to the low minute output, however, damage need not be so severe and return of quite good cardiac function is possible. Regardless of stroke capacity, the combination of fresh infarct and slow rate is apt to cause a decline in minute output due just to the vicious effect of ischemia on contractile force.<sup>7</sup> Though pressor therapy alone will not always be as helpful as in this case, these are patients in whom timely preservation of coronary flow can result in striking recovery.

There are other dynamics which should be considered. Diastolic size of the heart may increase with bradycardia, and if there is dilatation initially, fibers can be so stretched that the force of contraction suffers. Also, when hypervolemia exists, the same drop in minute output is a bigger detriment to the circulation than if blood volume is normal, and output can be low indeed when infarction and total block occur together. Further, when atria and ventricles beat out of phase, ventricular blood is now and then ejected past partly open membranous valves back into the venous trunks.<sup>8</sup> Such features reveal how important good coronary flow is to these persons so that avoidable ischemia will not make systole any less effective. Pressor therapy keeps to a minimum the weakness that stems from prior cardiac lesions, at a time when full systolic power may be sorely needed.

Of great interest are aspects of the change in rhythm itself. Total block may appear at the time of infarction or not for a day or more. As the region of the A-V node is protected from infarction by a rich anastomosis, this arrhythmia is usually attributed to hypoxia of that zone,<sup>9</sup> any delay being for ischemia or oxygen unsaturation of the blood to reach a critical level. This is perhaps the rule when block follows an anterior infarct, but if the lesion is posterior, as is usual, conducting tissue can also be caught in the necrosis or the reaction it excites. Onset and duration of block possibly vary on that basis. Inflammation is probably just a minor factor, viable muscle about an infarct having a marginal blood supply that accounts for extension. Extension is more likely if ischemia is aggravated by a marked fall in blood pressure, the very picture infarcts with dissociation are apt to present. It is all the more important to avoid extension in these cases lest block be permanent as a result. Prompt use of Levophed Bitartrate may spare some of these persons this lasting handicap or abolish the arrhythmia and simplify recovery; reports of the latter are already in the literature.<sup>6</sup> With no other group of myocardial infarcts does pressor therapy have this role.

Fixation of ventricular rate is also a problem at times. Complete block is often thought to imply a fixed rate, but Gilchrist's<sup>10</sup>

study of A-V dissociation showed true fixation to be unusual. Regardless of cause, he found a rise of four beats per minute with each degree of fever and a wide range of response to exertion, some persons showing an increase of 50 per cent but others none. That even fever may fail to cause acceleration is seen in figure 1. These differences are probably related to location of the pacemaker and to variable nervous factors, but pertinent here is that fixation occurs. If stroke volume is close to capacity and there is inability to increase heart rate, a febrile illness will challenge the circulation.

When there is fever and need for copious systemic perfusion, limited cardiac output can result in hypotension and a drop in coronary flow. How big a problem total block may be even without pyrexia is shown by the hypometabolism to which chronic cases are prone.<sup>11,12</sup> The febrile response to an infarct is seldom as marked as graphed here, but serious heart disease is often complicated by infection. Whatever the cause, fever combined with a fixed ventricular rate is a grave threat to persons whose stroke capacity is low. In sustaining pressure by a contraction of the vascular bed, Levophed Bitartrate is especially helpful in such patients, this case being an example.

Even with other adjuvants, pressor therapy is unable to meet the circulatory crises sometimes presented, and then an attempt is made to raise ventricular rate. In years past, ephedrine or epinephrine was usually tried, but use of either entails added risk of ventricular fibrillation and better agents are now available. For this purpose, isopropylarterenol hydrochloride (Isuprel Hydrochloride) and sodium lactate are safer and, judging from a variety of reports,<sup>1,11,14</sup> often very effective. These new agents are helpful too in abolishing ectopic foci when, though blood pressure normal, ventricular speed is so slow as to lead to hypoxic irritability of heart muscle. Quinidine sulfate is unsafe if there is heart block. With bradycardia easier to manage, more chances to treat these cases successfully are likely.

Besides sustaining blood pressure when cardiac output is limited, effective pressor therapy assures the better perfusion of heart muscle that bradycardia makes possible. During systolic blood vessels in the myocardium are compressed, tachycardia leading to heart failure if diastole becomes too brief for the muscle to be nourished.<sup>15</sup> As a rule, this is seen only with quite high rates, but each contraction makes some foci ischemic, those of the endocardium being susceptible to necrosis because the pressure is close to cavity pressure.<sup>16,17</sup> Also, even moderate tachycardia seems important to avoid if atherosclerosis limits coronary flow or a fresh thrombus blocks a major conduit.<sup>18</sup> If aortic pressure is low, a slow ventricular rate may allow unusually long diastole, but a slow ventricular rate may be turned to advantage

showing coronary flow to rise as heart rate falls and greater increments to occur as speeds approach those typical of A-V dissociation.<sup>19</sup> Support is found too in the recent report that angina often disappears with the advent of complete block.<sup>20</sup>

Only a study of many cases can test such concepts and show if these patients derive special benefit from pressor therapy. Notable, however, is a paper by Binder and associates<sup>4</sup> on Levophed Bitartrate in shock after cardiac infarction, the most striking results being in a small group with total block. The poor outlook for those persons is usually blamed on the diffuse coronary atherosclerosis often present,<sup>9</sup> but emphasis on this alone is arbitrary as there seems to be no clinicopathologic review of a large series. As these cases are uncommon, it is hoped this analysis will lead to pooling of experience and more awareness of what therapy offers the occasional patient.

### SUMMARY

Infarcts of the heart that lead to complete A-V block are often fatal, yet the high mortality is in part related to the change in rhythm which may be temporary. If coronary flow were sustained during this crucial phase, more of these persons might survive and regain their cardiac function. Vasopressor therapy probably has special value in this situation, as illustrated by the case reported herein. As safe agents are available for raising ventricular rate, there is added reason to recognize the opportunity for treatment that these patients present.

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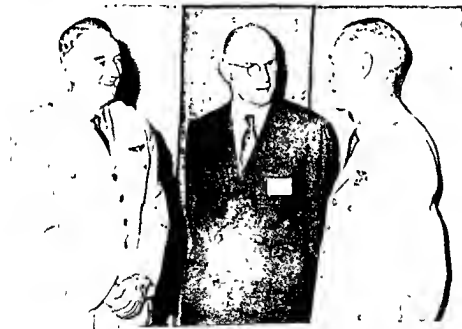
## NOT VITAMINS ALONE

"Many patients in a hospital for chronic diseases had been taking large doses of brewer's yeast over long periods of time—months and years. The utter inadequacy of this therapeutic approach was quickly revealed by a mere glance at the large number of cachectic persons in this group. In other words, vitamins per se, or any other preparation designed to stimulate eating, are totally ineffective without provision of a diet containing sufficient calories. We believe that the treatment for undernutrition is a good diet, not vitamin supplements."

—JOSEPH I. GOODMAN, M. D., and  
WILLIAM DOWDELL, M. D.  
in *Annals of Internal Medicine*  
p. 1256, Dec. 1955

### DOCTOR BERRY AND GENERAL OGLE VISIT NEW HOSPITAL

Doctor Frank B. Berry, Assistant Secretary of Defense (Health and Medical), accompanied by Major General Dan C. Ogle, The Surgeon General, Department of the Air Force, visited Brigadier General Edward J. Tracy, the Surgeon, Headquarters Air Materiel Command, USAF, at Wright-Patterson Air Force Base, Ohio, on the occasion of the opening of the new U. S. Air Force Hospital at that base.



The new Air Force area hospital, dedicated at Wright-Patterson on 21 September 1956, has facilities for 300 authorized operating beds, with a potential expansion to 426 beds in an emergency or under mobilization circumstances. Complete medical, surgical, and dental care is furnished to military personnel stationed in the Ohio area. This new modern medical facility is the sixth largest of the Air Force hospitals.

## A MESSAGE FROM THE A. M. A.

This past year our monthly "Messages" in this *Journal*, with the exception of the one in the October issue, have been devoted to the varied activities and services offered by the American Medical Association. The first article in the series pointed out that the Association has as its objective the promotion of the science and art of medicine and the betterment of public health. It is a physician's organization existing to serve the physician and the general public.

The major emphasis of the American Medical Association is upon its scientific activities. As the last message of this year, it is most appropriate to discuss the purpose and activities of the Council on Scientific Assembly and the Bureau of Exhibits of the Association.

The Scientific Program at the Annual Meeting of the American Medical Association is the culmination of more than one hundred years' experience in program building. Beginning in 1847, there was a gradual increase in the scope and importance of activities at annual meetings until 1915, when the Council on Scientific Assembly was organized by the House of Delegates to correlate the work of the various sections and to stimulate better programs. Meanwhile, in 1899, the Scientific Exhibit had been organized under a separate committee of the House of Delegates. In 1921, the Board of Trustees took over the Scientific Exhibit and administered it under a committee of three members of the Board. This situation of two program committees competing for the attention of the same audience continued until 1953, when the Council on Scientific Assembly was transferred to the Board of Trustees and combined with the Committee on Scientific Exhibit.

The character of medical meetings has changed markedly even during the last half century. At the meeting of the American Medical Association in Denver in 1898, the year before the Scientific Exhibit was initiated, there were 615 papers listed on the program. These were read by "essayists," few of whom had co-authors. At the last meeting of the Association in Chicago in 1956, with a greatly increased attendance over the 1898 meeting and an increase in the various Sections, the number of "papers" had been reduced to 244, nearly half of which were authored by

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From the Council on National Defense of the American Medical Association. The views and opinions expressed are not necessarily those of the Department of Defense.  
—Editor



two to five persons working in collaboration. Other features of the meeting included more than thirty panels and symposiums on various subjects, over three hundred scientific exhibits covering all phases of medicine, four full days of color television, which brought the operating room directly into the meeting hall, and a spectacular group of motion pictures, many of which were explained by the authors as the pictures were shown on the screen. The spoken word is still necessary to convey information, but medical audiences prefer to be talked "with," rather than talked "at," and to look rather than merely to listen.

More than fifty persons are responsible for different portions of the program for the Annual Meeting, including the Section Secretaries, the Section Representatives to the Scientific Exhibit, and chairmen of various special committees for different activities such as the special exhibit on fractures. All of these report to the Council on Scientific Assembly, which acts as a clearing house to eliminate duplications and conflicts and to co-ordinate all activities into a smooth-working whole.

The Clinical Meeting of the American Medical Association, which was started in 1948, is intended to supplement the Annual Meeting by going to cities that cannot accommodate large crowds. Interest has been increasing in the Clinical Meeting, and many physicians find the program more interesting than the Annual Meeting because of the intimate character of the presentations. There is a full schedule of lectures, round tables, panels, scientific exhibits, color television, and motion pictures, but the Sections do not meet. The program is arranged with the co-operation of a local committee in the city where the meeting is held.

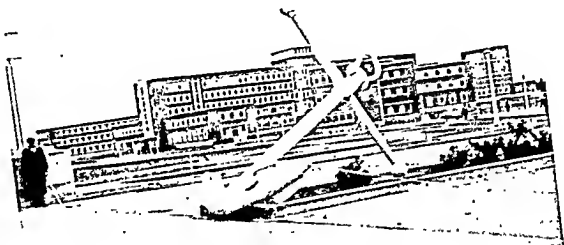
The Bureau of Exhibits, established in 1930, prepares and presents exhibits that depict activities of the various departments of the American Medical Association. The work is carried on in co-operation with the different councils, bureaus, and committees. It furthers both graduate medical education and public health education by graphically presenting scientific and health materials.

Medical exhibits for professional audiences are shown at meetings of state and county medical societies and gatherings of other medical groups and scientific organizations such as dentistry, pharmacy, and veterinary medicine.

Health exhibits for the public are presented at state and county fairs and other public gatherings. Receptive audiences are found at health fairs and expositions as well as at the occasional World's Fair. Museums, both the health museum as found in Cleveland or Dallas and the Museum of Science and Industry in Chicago, reach millions of people who are in a receptive mood for health education.

## MEDICAL SERVICE OFFICERS DECORATED BY REPUBLIC OF PERU

At ceremonies dedicating the new Naval Medical Center of Peru on 4 July 1956 at Lima, Peru, Captain Harry C. Oard, MC, USN, and Lieutenant Commander Charles R. Wannamacher, MSC, USN, were awarded the Peruvian Naval Cross for Merit in the grade of Knight Commandant—distinguished as White.



The citations, signed by Rear Admiral Alfredo Sousa Almandoz, Secretary of the Navy of Peru, stated that Captain Oard "as advisor to the Medical Department has given exceptional service to the Peruvian Navy. In the pursuit of his duties, at first as Chief and later as Surgeon General of the Medical Department of the Peruvian Navy, he has at all times displayed the invaluable attributes of his professional capability, training, and experience, and has worked with particular interest for the good of that department. Likewise, he has contributed by his zeal and devotion to the excellent organization and function of the new Naval Medical Center, of which he is the Commanding Officer . . . . He has contributed greatly to the longstanding ties of sincere friendship and loyal cooperation which happily exist between the Navies of the United States of North America and Peru."

Lieutenant Commander Wannamacher was praised in the citation Rear Admiral Almandoz "for the magnificent work which he has performed and continues to perform for the better outfitting of the Peruvian Navy."

Naval Medical Center." His efforts have "contributed decidedly in enabling the Naval Medical Center of Peru to fulfill, with true efficiency, its mission for the good of the Navy and the health of its personnel."



*Vice Admiral Roque A. Saldías, Secretary of the Navy of Peru, decorating Captain Harry C. Oard, MC, USN, with the Peruvian Naval Cross for Merit.*

Lieutenant Gertrude Oard, NC, USNR, wife of Captain Oard, also was decorated with the Peruvian Naval Cross for Merit in the degree of "Officer"—distinguished as White, for as "instructor and advisor in the Art of Nursing in the Hospital Corps School of the Navy (she) has contributed unusually excellent services to the Peruvian Navy."

Among other distinguished guests present at the dedication ceremonies were Rear Admiral Bartholomew W. Hogan, MC, USN, Surgeon General of the United States Navy; Rear Admiral Charles W. Wilkins, USN, Director of Pan-American Affairs, Naval Missions and Advisory Groups Division, Office of the Chief of Naval Operations; Rear Admiral Milton E. Miles, USN, Commandant of the Third Naval District; and Rear Admiral Clarence L. C. Atkeson, USN, Commandant of the Fifteenth Naval District.

The Peruvian Naval Medical Center was built from the plans that were used for the construction of the U. S. Naval Hospital, Beaufort, S. C.



*Lieutenant Commander Charles R. Wannamacher, MSC, USN, receiving the Peruvian Naval Cross for Merit from Vice Admiral Roque A. Saldias.*

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### THE HOSPITAL AND THE DOCTOR

Altruism alone does not prompt a doctor, contemplating establishing a practice, to inquire about the hospital facilities of a community. The hardships and inefficiencies of a house-to-house practice, the long vigil at the bedside of a critically ill patient, and the restrictions that are inevitable through distances and lack of trained personnel have little appeal. It is the district served by a good hospital that attracts the members of our profession.

—KARL HOLLIS, M. D.

*in Canadian Medical Association Journal*  
p. 774, May 15, 1955



# UNITED STATES ARMED FORCES MEDICAL JOURNAL

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LIEUTENANT COMMANDER S. O. WAIFE (MC) USNR

UNITED STATES  
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WASHINGTON : 1955

## Monthly Message

This is the second of two messages based upon an address given by President A. Whitney Griswold of Yale on the practical value of a liberal education. To answer the questions propounded in my last message, at any one time between the years 1900 and 1950 there were between 10 and 13 million foreign-born with 15 to 25 million of their children in this country. Most of these came from humble circumstances abroad; lands in which liberal education, liberal arts, and the old medieval curriculum and its modern evolutionary counterpart were thought of as the privilege of the well-to-do rather than the opportunity of the many. In 1920, for example, there were 35 million of these people living in the United States; almost a third of our population. Likewise our own Negro citizens have only begun to come into their own during the last 50 years; in 1920 their population was about 10,400,000, which with the 35 million foreign-born and their children made a total of 45 million who had had relatively little educational experience.

The influence of the frontier had both its stimuli and disadvantages. For example, the self-education of Abraham Lincoln under extraordinarily difficult surroundings in early life is known to all of us. Of necessity he read Gibbons' *Decline and Fall of the Roman Empire*, Shakespeare, The Bible, Bunyon's *Pilgrim's Progress*, and when a Congressman, continued his study and mastered Euclid. This type of education is considered out-of-date and many look upon it with scorn.

The phrase "Liberal Arts" means the arts appropriate to free men. In earlier days these were grammar, rhetoric, logic, music, arithmetic, geometry, and astronomy; all now a part of what we call arts and sciences. Their purpose was not to fill the mind with factual knowledge but to train one to use one's mind in inquiry and exploration. Liberal arts provide a humane conception of a society in which one lives, surrounded by technological devices and practices; it gives the lawyer or doctor historical and philosophical breadth, and supplies enlightenment, taste, virtue, and imagination to all. These values have been damaged by the very school system that has striven to uphold them, false ideas that students are a nuisance and that if it were not for them research would be furthered more than it already is.

Frank B. Berry

FRANK B. BERRY, M. D.  
Assistant Secretary of Defense  
(Health and Medical)





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## Foreword

The *United States Armed Forces Medical Journal* is the medium for disseminating information of administrative and professional interest to all medical personnel of the Department of Defense. The Assistant Secretary of Defense (Health and Medical) and the Surgeons General of the several services invite all medical officers, dental officers, Medical Service Corps officers, Nurse Corps officers, and officers of the Veterinary Corps of the Armed Forces, and the medical consultants of the Army, Navy, and Air Force to submit manuscripts for publication in this *Journal*.

FRANK B. BERRY, M. D.,  
*Assistant Secretary of Defense (Health and Medical).*

MAJOR GENERAL SILAS B. HAYS,  
*Surgeon General, United States Army.*

REAR ADMIRAL BARTHOLOMEW W. HOGAN,  
*Surgeon General, United States Navy.*

MAJOR GENERAL DAN C. OGLE,  
*Surgeon General, United States Air Force.*

# UNITED STATES ARMED FORCES MEDICAL JOURNAL

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Number 1

## ACUTE CORONARY INSUFFICIENCY

### *Its Importance in Military Medicine*

ARTHUR M. MASTER, M. D.

HARRY L. JAFFE, M. D.

LEONARD E. FIELD, M. D.

**A**CUTE coronary insufficiency is of interest in military medicine, as in civilian practice, since military life exposes men to situations and conditions capable of inducing coronary insufficiency. This condition arises whenever the coronary circulation becomes inadequate for the needs of the myocardium at the moment. Its occurrence is not limited to older people but also is common in the young. The prevalence of coronary disease is indicated by the mortality statistics. In 1952 it was recorded as causing 325,135 deaths in this country, independent of hypertension and other heart diseases.<sup>1</sup> Thus, it was listed as the cause of more than 60 per cent of all cardiac deaths. As a matter of fact, coronary disease accounts for over 80 per cent of cardiovascular deaths, inasmuch as it is probably the cause of death in the majority of patients with hypertension and in many of those listed as "other myocardial degeneration," "acute myocarditis not specific as rheumatic," et cetera.<sup>1</sup> Postmortem studies indicate that significant coronary disease is present in one out of two apparently healthy men between 36 and 46.<sup>2</sup> We estimated that over 1,000,000 new attacks of coronary occlusion occur annually in this country.<sup>3</sup>

These figures hold for all age groups, but it has become increasingly evident that coronary disease, far from being limited to the older age levels, is common in young men. The diagnosis of coronary occlusion is now commonplace in men in their 30's, and it is being detected even in those in their 20's.<sup>4-16</sup> Enos and his associates<sup>15</sup> found significant narrowing of the coronary

From Mount Sinai Hospital, New York, N. Y. The authors were on active duty during World War II as Capt. A. M. Master (MC) USNR, Lt. Comdr. H. L. Jaffe (MC) USNR, and Maj. L. E. Field, MC, AUS.

Read before the Section on Military Medicine, American Medical Association, Atlantic City, 7 June 1955.

arteries, *i. e.*, 50 per cent to almost complete occlusion, in 15.3 per cent of men killed in action in Korea between the ages of 16 and 48. They reported lesser evidence of gross coronary disease in an additional 62 per cent. Country<sup>14</sup> recently reported 14 cases of acute coronary thrombosis in airmen between the ages of 23 and 35. The most dramatic data demonstrating this fact are obtained in numerous studies during World War II and the Korean episode.<sup>15-16</sup> In fact, Yater and his associates<sup>14</sup> collected 866 cases in patients under the age of 40.

### DEFINITION

There is considerable confusion in the medical literature concerning the meaning of the term coronary insufficiency. Although its effect on the myocardium may be permanent, it usually refers to a transitory and reversible insufficiency of coronary flow. The attack may be induced by obvious conditions or factors capable of inducing coronary insufficiency or may occur spontaneously without an obvious precipitating cause. In the latter case, the attack may at first be indistinguishable from the premonitory phase of coronary occlusion with major infarction.<sup>17, 18</sup>

Acute coronary insufficiency includes a variegated group of attacks more prolonged and severe than simple anginal episodes, but without the typical signs of major infarction and the characteristic electrocardiographic pattern of coronary occlusion.<sup>19, 20</sup> In mild attacks of acute coronary insufficiency the electrocardiogram may show no change, but usually RS-T depression and/or T-wave inversion appear (fig. 1). It is transitory in mild cases but persists for several days or weeks in more severe cases. Clinically, no evidence of myocardial necrosis or infarction may appear, or mild fever, leukocytosis, and acceleration of the sedimentation rate may be present, indicating some degree of necrosis. The postmortem material available reveals subendocardial necrosis without acute coronary occlusion.<sup>21</sup> This localization accounts for the type of electrocardiographic change found.

A word is required to define angina pectoris or the anginal syndrome. It is true that each brief episode of pain, almost always precipitated by effort, emotion, et cetera, and quickly relieved by nitroglycerin, represents a transitory state of coronary insufficiency with ischemia. However, we prefer to reserve the term acute coronary insufficiency for more prolonged attacks.

### DIFFERENTIAL DIAGNOSIS

In contradistinction to acute coronary insufficiency, acute coronary occlusion, in which there is complete, relatively rapid obstruction of the vessel with through-and-through infarction, presents a characteristic electrocardiographic pattern of RS-T elevation and deep Q waves (fig. 2). The attack occurs spontaneously

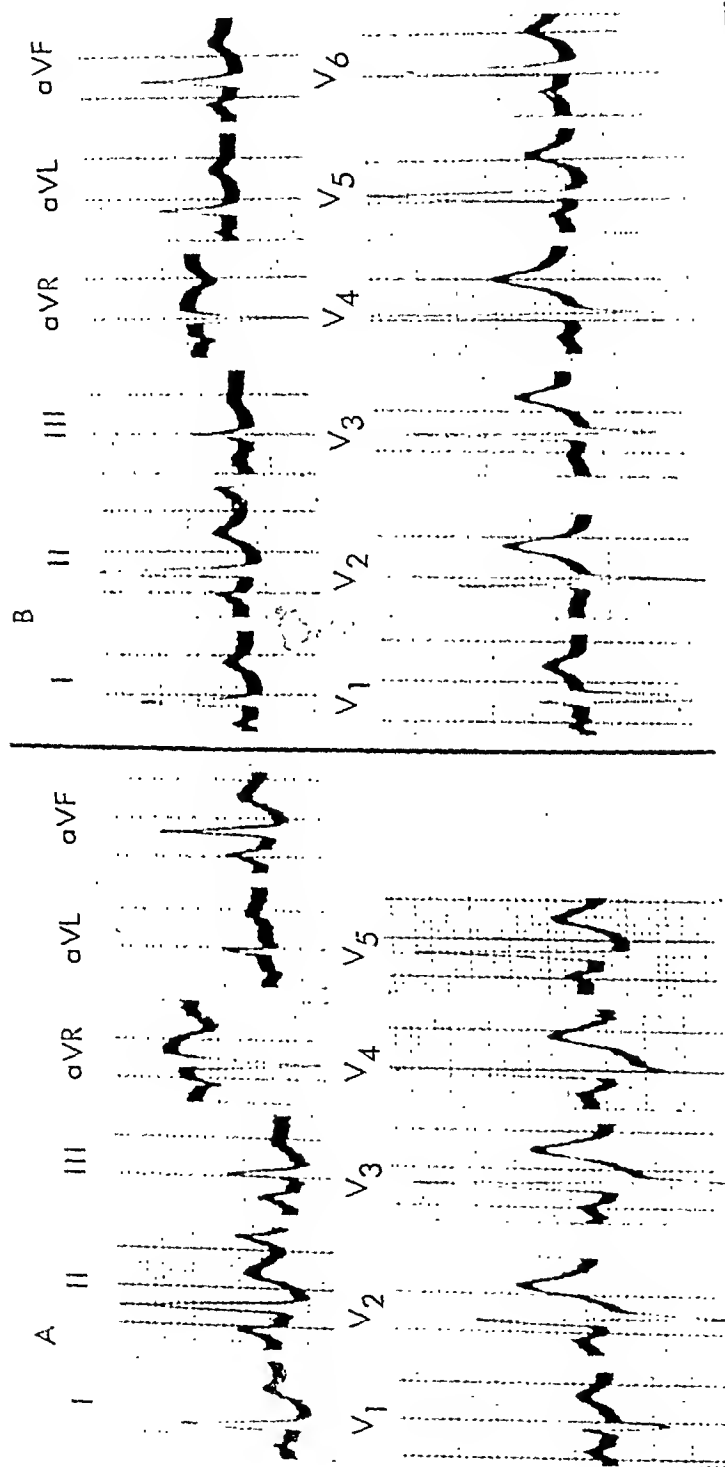


Figure 1. A 60-year-old woman developed acute coronary insufficiency 2 days after an operation for carcinoma of the colon. The patient was in shock (blood pressure, 50/20 mm. Hg) at the time tracing A was made. The hemoglobin was 9.5 grams per 100 ml. Mild chest pain was present. The electrocardiogram shows tachycardia with marked RS-T depressions. (B) Same day, following recovery from shock. RS-T depressions now minimal. The patient died 3 days later. Autopsy revealed subendocardial hemorrhages; hemoperitoneum; thrombosis, left hepatic artery.

and may be attended by shock, congestive failure, marked drop in blood pressure, and arrhythmias. The electrocardiogram exhibits permanent changes in 90 per cent of patients.<sup>24</sup>

There are infrequent exceptions to the criteria just given for differentiating acute coronary occlusion and acute coronary insufficiency and it is not always possible to decide in each case when first seen, into which of these it will prove to fall. Also, the clinical and postmortem findings are not always correlated. For example, acute coronary occlusion occasionally occurs without producing a major infarct; in some instances the course may be very mild and, finally, very rarely only inverted T waves may appear in the usual 12-lead electrocardiogram. Vice versa, in coronary insufficiency, massive, through-and-through infarction on rare occasion occurs without an acute occlusion, at times producing RS-T elevation and/or Q waves in the electrocardiogram. These changes may occasionally be seen briefly in clinical attacks.<sup>25</sup>

For these reasons, some authors have discarded the term coronary occlusion, grouping acute coronary attacks merely into those *without* and those *with* myocardial necrosis or infarction, regardless of the type of electrocardiogram present or whether acute coronary occlusion is present or not. For the attacks without evidence of infarction, a number of terms have been proposed, *e. g.*, coronary failure,<sup>26</sup> slight coronary attacks, acute atypical coronary artery insufficiency,<sup>27</sup> and intermediate coronary syndrome. Although all of these designations have some specific validity, it has been our experience that the terminology outlined above has proved to be practical and of clinical value. Acute coronary occlusion and acute coronary insufficiency can be differentiated electrocardiographically in at least 90 per cent of cases.<sup>28</sup> We do not think that it is of value to use the term coronary insufficiency in the widest general sense to include all coronary attacks, as has been suggested. The term coronary insufficiency serves a useful purpose, particularly in those cases of acute coronary insufficiency induced by precipitating factors such as those enumerated later; here a distinct clinical, electrocardiographic entity is presented which lends itself to prophylaxis and treatment. Also, it is useful to separate spontaneous attacks of coronary insufficiency, even when attended by subendocardial necrosis, from coronary occlusion with extensive infarction, because of their usually benign prognosis and, therefore, the lesser need for prolonged or intensive treatment. For example, in acute coronary insufficiency anticoagulant therapy is not required since peripheral emboli do not occur and the period of rest is relatively short.<sup>29</sup>

We should like to repeat that the use of the term myocardial infarction, regardless of the type of electrocardiogram present,

or whether it is caused by coronary occlusion or insufficiency, appears to be inadequate to describe the different types and degree of infarction. If the term myocardial infarction is used as the primary diagnosis, it should be qualified as myocardial infarction secondary to coronary occlusion or to coronary insufficiency. We have adopted this procedure in respect to acute coronary insufficiency, *e. g.*, we divide the latter into spontaneous coronary insufficiency and coronary insufficiency secondary to effort, emotion, hemorrhage, tachycardia, or other factors. Also, we refer to coronary insufficiency with ischemia or with necrosis.

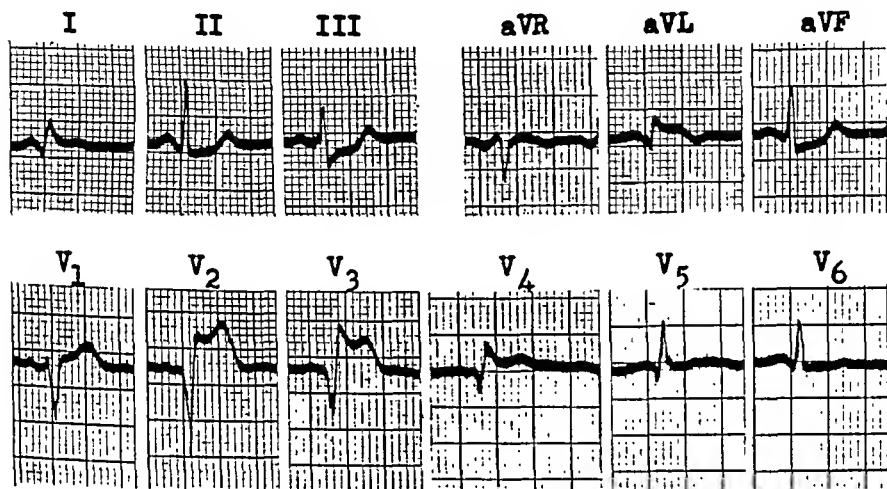


Figure 2. Acute coronary occlusion, second day. Antero-septal infarction with characteristic changes in lead aVL.

### INCIDENCE

It is difficult to make any estimate of the incidence of acute coronary insufficiency because many mild attacks are undetected and many more are diagnosed as coronary thrombosis. Yet sufficient data are available to make it evident that this condition is very common and is the usual cause of sudden death. Thus, Levy and Bruenn<sup>28</sup> found no evidence of coronary occlusion in 337 of 376 fatal cases of acute coronary disease, and Kroetz<sup>29</sup> reported 45 per cent without coronary occlusion. Hallermann<sup>30</sup> found that 79 per cent of sudden deaths in a series of coroners' cases were caused by coronary sclerosis without thrombosis. French and Dock<sup>8</sup> reported that in 51 of 80 cases of sudden death from coronary disease in young soldiers, there was no evidence of occlusion. Newman<sup>31</sup> stated that postmortem examination in 39 patients who died of coronary disease revealed 29 to be free of thrombus in the vessels. Moritz and Zamcheck<sup>31</sup> found that there was no coronary occlusion in three fourths of 300 cases of sudden death caused by coronary sclerosis in young soldiers.

In another investigation of sudden cardiac deaths Munck<sup>12</sup> found coronary sclerosis without thrombosis in 255 of 396 patients. Poe<sup>13</sup> failed to find evidence of coronary occlusion in five of nine fatal cases of coronary disease in young men. Master, Carroll, and Andrews<sup>7</sup> found a similar incidence in a naval hospital. In a detailed report of 450 autopsies in men 18 to 39 years of age who died of coronary disease, Yater and his co-workers<sup>14</sup> discovered a thrombotic occlusion in only 229, that is, about 50 per cent. Similar findings were reported by Spain and associates.<sup>1</sup>

In the last 1,000 consecutive, office, private cardiac consultations by the senior author of the present article, episodes of acute coronary insufficiency were diagnosed in 91 patients, or almost 16 per cent of the 567 patients with coronary disease (table 1). It is our impression that its actual incidence is considerably higher; this would appear in our figures if home consultations were included.

TABLE 1. *Diagnosis in 1,000 consecutive office cardiac consultations\**

<i>Organic</i>	704
Coronary disease, chronic	258
Coronary occlusion, acute	218
Coronary insufficiency, acute	91
Chronic rheumatic cardiac valvular disease	66
Hypertension	32
Chronic cardiac valvular disease (nonrheumatic)	26
Congenital	8
Pericarditis	4
Subacute bacterial endocarditis	1
<i>Functional</i>	296

\*These represent the primary diagnoses. The order of preference was (1) coronary occlusion, (2) coronary insufficiency, (3) coronary disease, et cetera. Hypertension was present in 253 additional cases.

It is thus evident that acute coronary insufficiency is a common disease in all age levels.

### ETIOLOGY

As stated before, acute coronary insufficiency may be induced by conditions rendering the coronary circulation inadequate for the specific requirements of the myocardium.

The precipitating factors may be divided into three groups: (1) those increasing the work of the heart, such as effort, excitement, a large meal, sudden rise in blood pressure, fever, acute infections, gastroenteritis, hyperthyroidism, excessive smoking,

acute abdominal conditions, marked changes in temperature; (2) those decreasing the coronary flow, such as shock, hemorrhage, tachycardia, trauma, pulmonary embolism; (3) those altering the composition of the blood such as anemia, carbon monoxide poisoning, excessive altitude. As a matter of fact, in the majority of patients several of these factors are present.

Table 2 lists the activity at the onset of 200 attacks of acute coronary insufficiency studied. It will be seen that two thirds of the attacks began without known precipitating cause. In the remainder, acute hemorrhage, pulmonary embolism, effort, tachycardia, and surgical procedures were the most common exciting conditions. These figures indicate that acute coronary insufficiency usually occurs spontaneously.

TABLE 2. *Activity at onset of coronary insufficiency (200 attacks)*

Spontaneous	132	Trauma	1
Hemorrhage	12	Acute cholecystitis	1
Pulmonary embolism	10	Acute pancreatitis	1
Unusual effort	9	Gastroenteritis	1
Tachycardia	7	Hypertensive crisis	1
Surgical procedures	7	Postsympathectomy	1
Meals	6	Carbon monoxide	1
Excitement	4	Tobacco and alcohol	1
Asthma	2	Addisonian crisis	1
Acute heart failure	2		

In their cases, Yater and associates<sup>14</sup> found no correlation between the type of activity at the onset of the acute coronary attack and the type of pathologic change in the coronary arteries.

In military service, trauma, shock, acute hemorrhage, and strenuous exertion are apt to be frequent occurrences. Sudden immersion in cold water may occur in naval personnel, and a sudden lack of oxygen in flyers who bail out at high altitudes or whose pressurized cabin is pierced. Acute coronary insufficiency has been reported to occur following sudden excitement, for example, hearing of a death or a heated argument, and activities such as going through an obstacle course, participating in a battle indoctrination course, rescuing a drowning man, crawling through an infiltration course, drilling, pushing a car, flying, participating in a shakedown cruise on a warship, marching, or using an exercise machine. A combination of a heavy meal, smoking, and drinking not uncommonly brings on coronary insufficiency.

The importance of acute hemorrhage in inducing acute coronary insufficiency has been demonstrated by us.<sup>33, 34</sup> Acute hemorrhage induced fairly severe coronary insufficiency in 4 of 25 patients who came to autopsy.<sup>35</sup> In a group of 103 patients ranging from



18 to 79 years of age, all of whom had had varying degrees of hemorrhage, 57 per cent presented clinical or electrocardiographic evidence of acute coronary insufficiency.<sup>34</sup> Shock, tachycardia, fall in blood pressure, and decrease in blood volume were all important factors in the mechanism involved. Anoxemia due to decreased hemoglobin was also important, although the principal factor seemed to be the rapidity of blood loss. It is noteworthy that of the four patients in whom myocardial changes secondary to coronary insufficiency were found at autopsy, two had normally patent coronary arteries, one showed moderate coronary sclerosis, and one severe coronary disease. Thus, coronary insufficiency with necrosis may occur even in persons with normal hearts. Shock and hemorrhage are to be expected among battle casualties and their prompt treatment serves to prevent irreparable heart damage.

In addition, there are several predisposing conditions which favor the development of acute coronary insufficiency. In their analysis of 25 patients who came to autopsy, Horn and his associates<sup>35</sup> noted that the heart was hypertrophied in 22; 14 had severe coronary disease, 5 moderate coronary arteriosclerosis, 6 mild or no atheromatosis; aortic stenosis was present in 5; mitral stenosis in 1, and syphilitic aortic insufficiency in 1. The presence of these structural lesions impairs the ability of the heart to make adequate compensatory changes and accordingly renders the myocardium more vulnerable to acute coronary insufficiency. Yater and associates found cardiac hypertrophy in 52 per cent of their patients; it was of marked degree in 16 per cent. Certain nonorganic states, such as chronic anemia and hyperthyroidism, also predispose to coronary insufficiency.<sup>36</sup>

### **PATHOLOGY**

In mild, transitory acute coronary insufficiency no demonstrable changes are found, for the effect of the ischemia upon the heart muscle is entirely reversible. When the ischemia is prolonged or moderately severe, scattered, isolated areas of necrosis result. These vary in size from microscopic foci to larger, grossly visible confluent areas of disseminated necrosis (fig. 3).

The lesions are typically located in the subendocardium and papillary muscles of the left ventricle, and ultimately go on to healing and fibrosis. In the most severe cases, the entire inner shell of the left ventricle may show macroscopic, widespread confluent necrosis, often referred to as "subendocardial infarction." In very rare instances a through-and-through infarct develops.

### **DETECTION**

From the foregoing, the importance of detecting coronary disease in the military services is obvious, in order to avoid ex-

posure to the rigors and strain of military life, including excessive exertion, combat duty, and flying.

ANTERIOR

RIGHT

LEFT

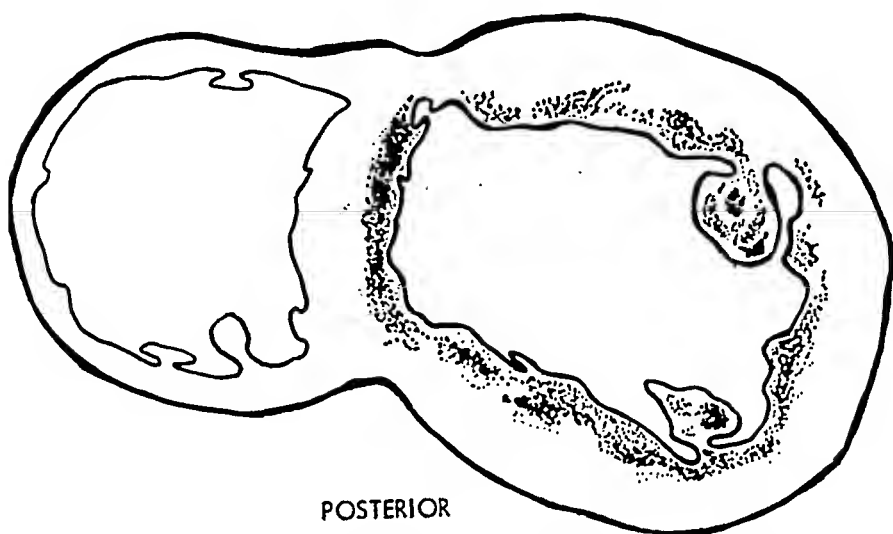


Figure 3. Diagram illustrating extensive disseminated subendocardial necrosis due to severe acute coronary insufficiency. The entire inner shell of the left ventricle was involved. The heart was hypertrophied (575 grams), and moderate coronary arteriosclerosis and aortic stenosis were present. Acute gastrointestinal hemorrhage precipitated the coronary insufficiency.

There should be a greater awareness of coronary disease in young people so that even minor complaints are not overlooked. If there are complaints referable to the heart, a complete cardiovascular examination, including perhaps the 2-step exercise test, should be instituted. It must be remembered that from 40 to 50 per cent of persons with coronary disease and angina pectoris show no cardiac abnormality on examination and have a negative resting electrocardiogram. Such persons, however, almost always show significant changes in the 2-step exercise test.<sup>36</sup> It is doubtful that this will be true in many young men with asymptomatic coronary disease, yet, it would be advisable to perform the test in suspicious cases. It should be remembered that the test is positive in about 10 per cent of persons with normal hearts, particularly in tense, anxious people. Each case should be carefully evaluated.

#### TREATMENT

If acute coronary insufficiency is secondary to a specific precipitating cause, prompt and strenuous treatment of the latter may be lifesaving.

In *paroxysmal tachycardia*, the acute coronary insufficiency may dominate the clinical picture with precordial pain, shock, and electrocardiographic signs of myocardial ischemia. The institution of measures to abolish the tachycardia, such as carotid sinus pressure, digitalis, quinidino, or vasopressor drugs, is essential. If the tachycardia subsides, the signs and symptoms of coronary insufficiency may disappear abruptly.

In acute infections, particularly pulmonary and gastrointestinal infections, the early administration of the antibiotics may prevent coronary insufficiency.

In shock and hemorrhage, restoration of circulating blood volume, blood pressure, and hemoglobin by intravenous infusion of fluid, plasma, and blood is imperative. We have observed many patients in the coronary age group, and even younger, in whom a sudden, massive gastrointestinal hemorrhage produced severe coronary insufficiency manifested by a clinical state simulating acute coronary occlusion, particularly when the internal hemorrhage was unrecognized. The treatment for hemorrhage is adequate blood transfusion which should be instituted before the myocardium is impaired because, once such a state is reached, intravenous infusion is usually of no avail.<sup>27-30</sup> The value of a daily electrocardiogram lies in the fact that, not only is it an objective sign of coronary insufficiency, but also it reveals RS-T depressions and T-wave inversions which may precede the appearance of clinical evidence of coronary insufficiency. Blood should be administered until bleeding has ceased and pulse rate, blood pressures, hemoglobin determinations, and electrocardiograms have been restored to normal values.

The treatment of angina pectoris which appears during hemorrhage is blood replacement.<sup>31,32,33</sup> The occurrence of chest pain or the aggravation of pain ordinarily experienced by the patient constitutes an urgent indication for therapy. It is significant that chest pain appeared in 18 of the 103 patients reported and in each instance blood transfusion effected either amelioration or disappearance of this complaint.<sup>34</sup> The advisability of repeated transfusions may be questioned in patients with organic heart disease, in view of the possibility of inducing left ventricular failure. Such an eventuality is readily admitted. However, we firmly believe that the occurrence of this complication can be prevented, or its severity minimized, even when frequently repeated transfusions are indicated, by careful and slow administration of blood. Constant and studied clinical supervision is imperative.

In surgical procedures, anoxia secondary to anesthesia should be prevented by an open airway and by adequate oxygen intake. One must avoid "pushing" the anesthesia in patients with heart disease or other predisposing factor of coronary insufficiency.

Sufficient oxygen must always be available and proper ventilation is essential. Cyanosis, even if temporary, should be prevented. The type of anesthesia administered, local or general, is less important than the care used in its administration. Postoperative observation and avoidance of pain are extremely important.

Acute pulmonary insufficiency caused by acute pulmonary infection, bronchial asthma, and emphysema is a common precipitating cause for acute coronary insufficiency. The treatment of the pulmonary insufficiency and cor pulmonale with oxygen, bronchodilators, and antibiotics often causes the coronary insufficiency and electrocardiographic changes to disappear entirely. Particular care in the employment of morphine and oxygen is essential since the former may depress respiration in chronic cor pulmonale and high concentration of oxygen may remove the stimulus to respiration. Oxygen is administered intermittently, the percentage gradually increased, and given best under pressure. Bronchodilators such as vaponefrin (brand of racemic epinephrine hydrochloride) are very helpful, and meticorten (brand of prednisone) seems very promising.

In acute coronary insufficiency, recovery from the attack is often complete. We have found that the future outlook of patients following acute coronary insufficiency is usually excellent; more than four out of five live for many years and are able to work steadily.<sup>42, 43</sup> Therefore, it is our opinion that many, if not most, men in the military services who sustain an attack of coronary insufficiency may be retained if they are placed in appropriate lines of duty.<sup>43</sup> Naturally, each case must be evaluated in the light of the cause of the coronary insufficiency and the residual evidence of myocardial disease. Periodic re-examinations should be made and, on the basis of the results, the type of work may be altered from time to time. The majority of these patients should be able to perform useful and even essential work. If anginal pain, dyspnea, or a serious arrhythmia persists, the man should be discharged.

### CONCLUSIONS

Acute coronary insufficiency represents a sudden, transitory inadequacy of the coronary circulation for the requirements of the myocardium. It may occur spontaneously or be induced by factors increasing the work of the heart, decreasing the coronary flow, or altering the composition of the blood. It usually occurs in persons with coronary disease and cardiac enlargement but may occur in normal hearts. Death from acute coronary insufficiency is uncommon except in cases of "sudden death." Ordinarily, the patient survives and the outlook is excellent.

Acute coronary insufficiency results in ischemia or necrosis

of the subendocardial region. Because of this localization, the electrocardiogram presents RS-T depressions and/or T wave inversions, differentiating it from coronary occlusion. In the latter, through-and-through infarction occurs and Q waves and RS-T elevation are present in the electrocardiogram. This differential diagnosis holds in over 90 per cent of cases. The use of the terms coronary insufficiency and coronary occlusion is preferable to the unqualified term myocardial infarction.

Acute coronary insufficiency is probably more common than coronary occlusion. Coronary disease and acute coronary insufficiency are frequent in young men. In order to detect coronary disease, minor complaints referable to the heart should be carefully investigated.

Acute coronary insufficiency is a specific clinical and therapeutic entity, particularly when it is induced. Prompt treatment of the precipitating factor may be lifesaving, *e. g.*, frequent transfusions in hemorrhage. Recovery from acute coronary insufficiency is usually complete and most patients are able to return to work which is not strenuous.

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## LEADERSHIP AMONG PHYSICIANS

Physicians must be intelligent—medical schools quickly separate the wheat from the chaff. And they must be capable of a broad viewpoint from which to regard man and his ills, both physical and social, for medicine is no longer a matter of treating disease and ignoring the person. Because of this latter quality, physicians are peculiarly fitted for leadership in every walk of life, especially in a time when men are ruled more often by emotions and fears than by logic and concern for their fellows.

If we have let the duties of our profession, the obligations of social and financial success, and the very understandable desire for security blind us to these obligations of leadership in a time when it was never more badly needed, then it behooves us to pause for at least an hour or two and take stock. No other profession has the fine heritage and glorious traditions that ours has.

—FRANK G. SLAUGHTER  
in *Journal of Florida Medical Association*, p. 485, Dec. 1954

# DETECTION OF AORTIC INSUFFICIENCY IN RECENTLY INDUCTED MILITARY PERSONNEL

WILLIAM D. SCHIERMAN, *Captain, USAF (MC)*

EDWIN D. BAYRD, *Major, USAF (MC)*

**T**HE MURMUR of aortic insufficiency, when of low intensity, is one of the most difficult of all murmurs to hear. Because it is characteristically high-pitched, soft in quality, and heard best in an area where bronchial or bronchovesicular breath sounds are normally heard, it is easily missed on routine examination. The problem is compounded if the person is obese or the examination takes place in a room where a number of persons are present. In downtown examining stations, room noise may also be combined with street noises to make the perception of the soft aortic diastolic murmur difficult indeed.

Recently, in the course of routine ward and clinic duty at this hospital, three cases with findings of aortic insufficiency were observed. In contrast with this, in the past year and a half, there has been no instance of a previously undetected mitral lesion, and only one other disqualifying condition with associated physical findings including heart murmur (coarctation of the aorta) which was missed on induction but detected later. Thus, it appears that the screening of personnel with aortic insufficiency was most difficult. The following cases were reviewed in an attempt to determine whether similar errors could be prevented from occurring in the future.

## CASE REPORTS

Case 1. A 17-year-old airman was admitted to the hospital from the stockade for evaluation of a murmur that had been heard by the medical officer who examined him on commitment to confinement. The airman had been in the service for only 7½ months. While in basic training, he had been hospitalized on one occasion for an upper respiratory infection; no mention was made at that time of a heart murmur. The patient denied any symptoms of cardiac disease and no history suggestive of rheumatic fever in the past could be obtained. Additional past history was noncontributory.

The patient was a well-developed, well-nourished but not obese Negro, 5 feet 8 inches in height and 140 pounds in weight. The sig-

From U. S. Air Force Hospital, Scott Air Force Base, Ill. Dr. Schierman is now at 4161 Lindell, St. Louis, Mo.



nificant findings were as follows: Blood pressure was 120/10 mm. Hg. The apex impulse was forceful but the heart was of normal size on physical examination. A loud, rushing diastolic murmur, grade IV (basis of VI), persisting throughout diastole, was present. It was loudest along the left sternal border in the third and fourth interspaces, although it could also be heard well in the second interspace to the right of the sternum, and was transmitted over the whole precordial area. A Corrigan pulse, pistol-shot sounds over the femoral arteries, and pulsations in the suprasternal notch were also observed.

Findings of routine blood cell counts, serologic tests, and urinalysis were within normal limits; the sedimentation rate was 2 mm. per hour. An electrocardiogram showed findings of left ventricular hypertrophy (fig. 1) and by fluoroscopic radiographic examination the left ventricle was noted to be slightly enlarged (fig. 2). Throughout his hospitalization the patient's temperature was within normal limits, and evidence of active rheumatic fever was lacking.

A copy of the findings of his induction physical examination was obtained. No mention was made therein of any cardiac murmur or other abnormality. It was interesting to note that blood pressure had been recorded initially as 120/50 mm. Hg, erased, and changed to 120/60 mm. Hg. It was recommended that this patient be separated from the service.

*Comment.* It was believed that this was a case of aortic insufficiency of rheumatic origin, although a history of rheumatic fever was lacking. The magnitude of the murmur, electrocardiographic and fluoroscopic evidence of left ventricular hypertrophy, and an initial blood pressure of 120/50 mm. Hg suggest that the lesion was present when the airman entered the service.

**Case 2.** This 22-year-old airman was referred from another air base for cardiac evaluation because of a murmur. He had a definite history of rheumatic fever when 6 years old and a recurrence when he was 12 years old.

He was rejected for military service in January and August 1951, initially for flat feet, and then for a "heart murmur." Then he volunteered for the Air Force in January 1954 he was rejected because of "high blood pressure." Shortly thereafter, on routine selective service physical examination for induction into the Army, he was found acceptable, and on the basis of this examination he was subsequently accepted for enlistment into the Air Force in February. The past history was otherwise noncontributory.

Significant physical findings were limited to the cardiovascular system. Pulsations were noted in the suprasternal notch. No cardiac enlargement was found on physical examination; however, the apex impulse was forceful. A grade III diastolic murmur characteristic of aortic insufficiency was heard in the second interspace just to the

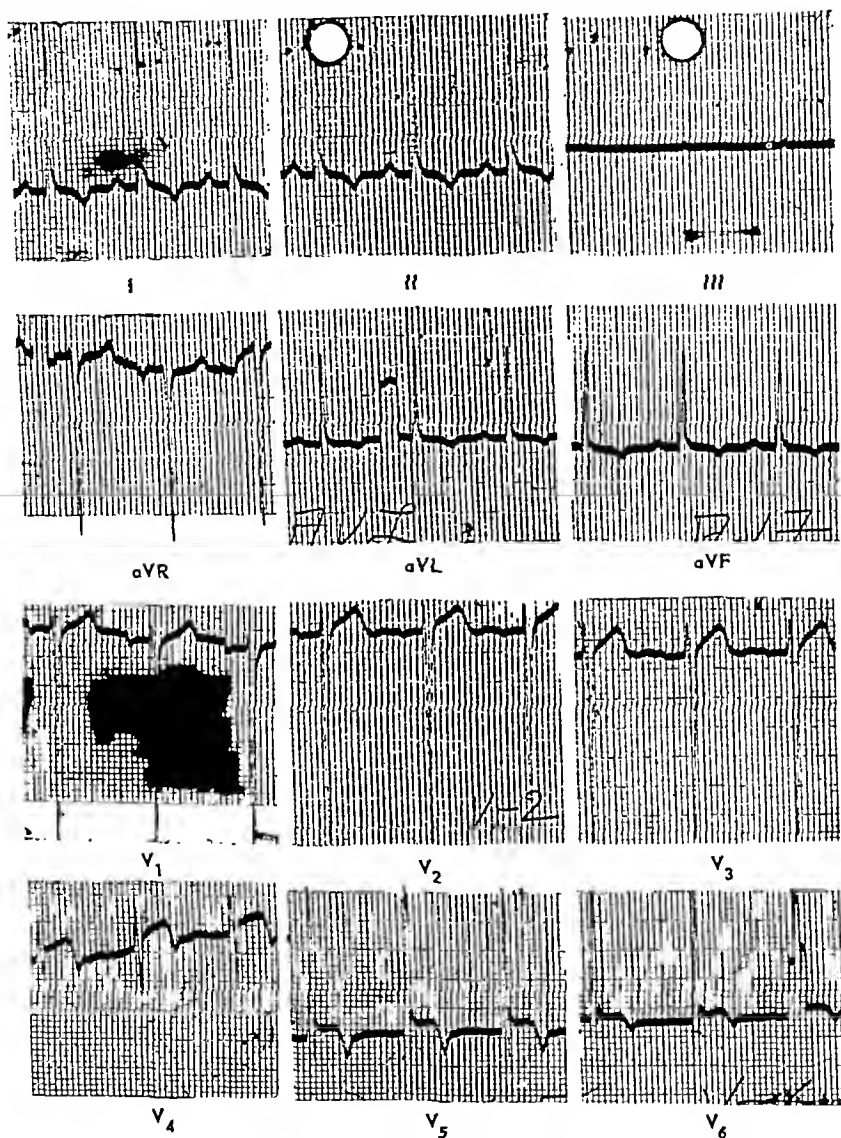


Figure 1 (case 1). Electrocardiogram showing left ventricular hypertrophy. The S wave in  $V_1$  measures 35 mm. The axis deviation index is 32 mm. Upwardly convex S-T segments are present in leads I and II with inverted T waves in leads I, II,  $V_5$ ,  $V_6$ , aVL, and aVF. The QRS interval is 0.09 second.

right of the sternum, and in the third interspace just to the left of the sternum. Blood pressures were as follows: right arm, 160/60 mm. Hg; left arm, 170/60 mm. Hg. Pistol-shot sounds were heard over the femoral arteries. The routine blood cell counts, serologic tests, and urinalysis were normal. The sedimentation rate was normal. Postero-anterior and oblique views of the chest showed no roentgenographic

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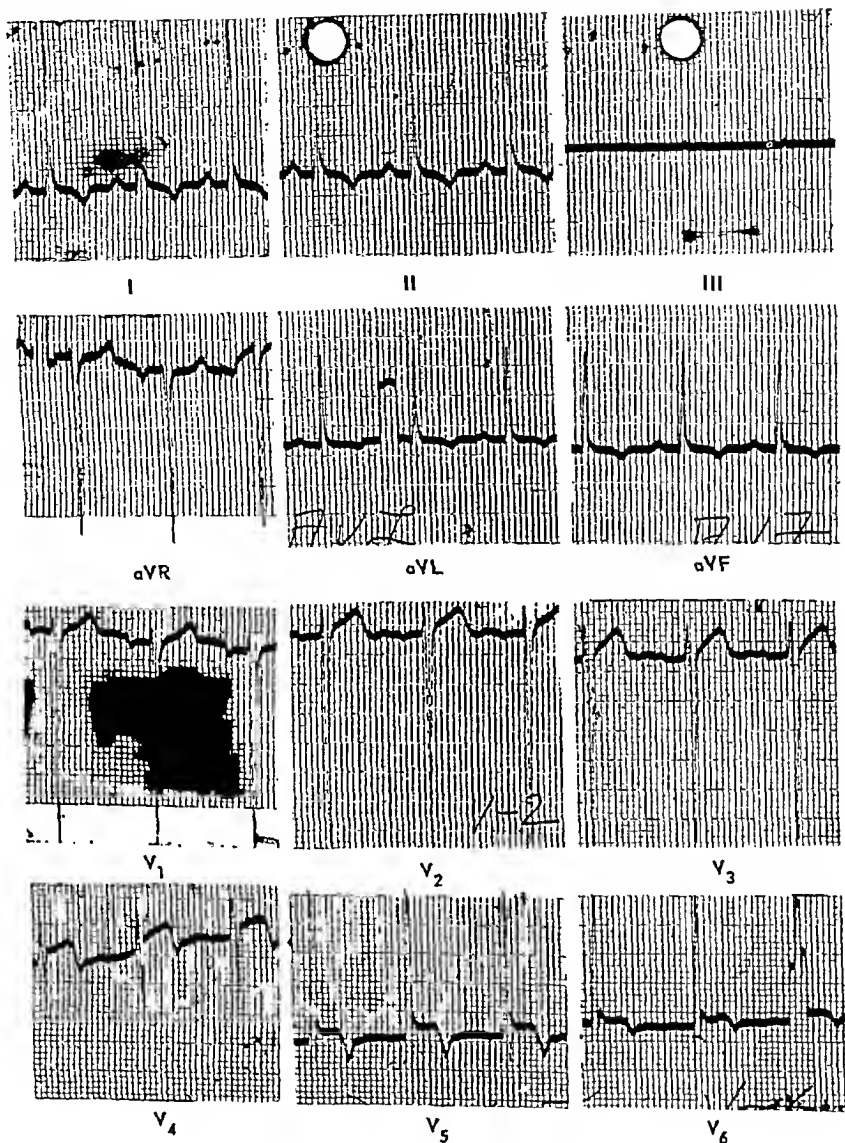


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evidence of chamber enlargement. Findings of an electrocardiogram were within normal limits.



*Figure 2 (case 1). Roentgenogram of chest showing somewhat boot-shaped configuration of heart.*

While in the hospital for evaluation this airman showed no evidence of rheumatic activity. He was examined in consultation with the civilian consultant in cardiology who concurred in the findings, and the patient was then transferred to appear before a physical evaluation board.

*Comment.* Because of the intensity of this patient's heart murmur and the history of his having been rejected for military service once for a "heart murmur" prior to his acceptable physical examination for the Army, it was believed that a perceptible murmur was present when this man entered the Air Force.

**Case 3.** A 22-year-old airman was transferred to this hospital for evaluation of a heart murmur detected on examination. He had a definite history of having had rheumatic fever at the age of 6, and he had

been hospitalized in a convalescent home for 1 year. During his convalescence his family was told that he had a heart murmur. He subsequently was followed throughout his childhood and adolescence by a cardiologist, who told him that he would be acceptable for military service. The only suggestion of recurrence of the rheumatic process after the initial attack was at the age of 12 when the patient noticed transient arthralgia for which he was not hospitalized. The patient had enjoyed unrestricted physical activity without difficulty, up to and including the moment when he appeared at the dispensary. He had been in the service for 2 years and was a jet aircraft mechanic. The remainder of the past history was not contributory.

On physical examination significant findings were again limited to the cardiovascular system. A grade II diastolic murmur was heard in the aortic areas as in the previous cases; however, it was necessary to have the patient lean forward in full expiration to hear the murmur clearly. A grade I to II soft systolic murmur was also heard in the mitral area with the patient in the left lateral position. The blood pressure was 125/60 mm. Hg. No pulsations in the suprasternal notch were noted. Faint pistol-shot sounds were heard over the femoral arteries.

On roentgenographic examination the heart presented a globular shape, but no definite chamber enlargement was found by fluoroscopic examination. Routine laboratory data, including serologic tests, were within normal limits and the electrocardiogram was normal.

No evidence of rheumatic activity was observed during the period of hospitalization. Because he had already had 2 years of service and had only a mild degree of aortic insufficiency, this man was returned to duty with a change noted in his physical profile records.

*Comment.* The history suggests that this airman probably had a murmur at the time he entered service. With the knowledge of previous rheumatic disease more careful examination at that time might have revealed the murmur.

#### SUMMARY

Three patients with murmurs of aortic insufficiency presumably unrecognized at induction examination demonstrate the difficulty in detecting this condition on routine examination.

Two patients had a history of rheumatic fever, while a third had an abnormally wide pulse pressure recorded at the time of his qualifying examination for military service. It was thought likely that all three patients had had audible murmurs at the time of their initial examination.

Consideration of these cases suggests that prospective inductees with wide pulse pressure, a previous history of rheumatic fever, or other cardiac abnormalities be examined with particular care to exclude the possibility of aortic insufficiency.

# EVALUATION OF PSYCHOTHERAPEUTIC SCREENING FOR ENURETIC RECRUITS

RICHARD W. FIRESTONE, *Lieutenant (junior grade) (MSC) USNR*

CARL M. WAGNER, *Lieutenant (junior grade) (MSC) USN*

DANIEL H. HARRIS, *Ph. D.*

**T**HE PROBLEM of nocturnal enuresis among military recruits is longstanding. In a significantly large proportion of cases terminating in general discharge at the recruit level, enuresis plays a very prominent role. Aside from the obvious inconvenience created for the training command, there is also to be considered the matter of expense involved in recruiting and in prematurely discharging the large number of men who at first are assumed to be intractably enuretic.

Investigation into this general area disclosed that several researchers had produced convincing evidence leading to the conclusion that enuresis in adults is primarily psychogenic in origin.<sup>1-4</sup> With this theoretic assumption as a guide, we suggested<sup>5</sup> and demonstrated<sup>6</sup> in earlier reports that the psychiatric screening interview, serving as a brief psychotherapeutic situation, could effectively aid many "borderline" enuretics who in the past might have been discharged as hopeless. Specifically, the screening interview was modified to include a permissive and reassuring discussion designed to relieve anxiety associated with enuresis, together with an attempt to focus positive motivation through plausible behavioral suggestions for overcoming the habit. Experimental results indicated that this procedure was instrumental in reducing by 60 percent the number of potential discharges among enuretics who were so treated, by enabling them to become asymptomatic.

## PURPOSE OF THIS STUDY

The therapeutic procedure described above was experimentally verified under necessarily stringent and formalized conditions. Sufficient time having elapsed since the termination of the experimental test period, it now seems appropriate to evaluate the extended effectiveness of this procedure as, less rigidly applied, it has been incorporated into a working routine for the day-to-day screening of enuretic recruits. Whether or not it is practicable, after all, can only be judged under average working conditions which have little in common with the refined control of an experimental atmosphere.

<sup>1</sup>From Marine Corps Recruit Depot, San Diego, Calif.

If the hypothesis implied here is valid, then its effect should be reflected in a lower discharge rate for enuretics. In order to evaluate this, all enuretic recruits considered for discharge during equivalent periods before and after the experiment were reviewed, particularly with regard to their final disposition.\* The recruits chosen were those in process during the two periods of 41 consecutive weeks preceding and following the experimental test period. Because it is sometimes alleged that enuresis increases in cold weather, both periods included all of the winter months in order to rule out any spurious effect from this source. Data used in this study included the aptitude board decision on each recruit, the General Classification Test (GCT) score, and the psychiatric impression on initial screening (PULHES "S" profile). Equating for general intelligence as measured by the GCT was accomplished by including only persons having scores above 65 (equals Navy GCT of 29). Results of the "S" profile comparisons will be discussed at length below.

### RESULTS

A breakdown of the relevant data (table 1) indicates that the aptitude board discharged a substantially smaller number of enuretics in the postexperimental period. On statistical analysis, the 26 percent difference between the pre- and post-experimental groups was shown to be highly significant; *i. e.*, the probability that this result could have occurred by chance alone was negligible. Since the only consistent differentiating factor known to be operating was the therapeutic variable, the results achieved may be attributed to it with a fair degree of certainty. This tends to reaffirm both the soundness and utility of the therapeutic principles developed in our experimental report.

TABLE 1. *Recruits discharged by the aptitude board during pre- and post-experimental periods*

Recruits discharged	Before experiment	After experiment
Total	375	240
Enuretics	229 (61%)*	90 (35%)*

\*Chi-square analysis revealed this difference to be significant at better than the .01 level.

To further amplify a comparison of the two groups of recruits, a breakdown was made of the "S" categories to which they were assigned during initial screening. The postexperimental group, as shown in table 2, contained a much higher percentage of psychiatric "suspects," which might suggest that this group was

\*Identical criteria for consideration and discharge of such cases were in effect before, during, and after the experiment.



composed of generally poorer material. An alternate supposition could hold that because the "borderline" group of enuretics in the postexperimental group never appeared before an aptitude board due to therapeutic intervention, the 90 discharged persons were the most recalcitrant ones, among whom it could be argued there would be a higher percentage of suspects. While either assumption would lend weight to the implications of the results in table 1, supportive evidence is lacking in both instances.

A better explanation for this discrepancy may lie in the fact that, as a carryover from the experiment, more thorough screening techniques were employed with the later group. This could very reasonably have increased the percentage of suspects discovered. The latter possibility also reinforces an hypothesis which the authors voiced in their experimental report with regard to the value of early detection. As in other areas of military psychiatry, the preventive value of early detection is also an important guide in psychiatric screening.

TABLE 2. Percentage of "S" profile categories assigned during pre- and post-experimental periods\* (see text)

Category	Before experiment (percent)	After experiment (percent)
S-1	40.8	21.9
S-2 plus S-3 (suspects)	59.2	78.1

\*Chi-square based on frequencies for the "S" profile categories was significant beyond the .01 level.

### THEORETIC CONSIDERATIONS

If one accepts a psychogenic explanation for adult enuresis, and recent research tends to support such a decision, then it follows that psychotherapy is the treatment of choice. One very recent confirmation is a well-controlled electroencephalographic study on the sleeping levels of enuretics, in which Ditrin and Blinn<sup>2</sup> reached these same conclusions regarding causation and treatment. Closson and Hildreth<sup>3</sup> have already demonstrated the usefulness of psychotherapeutic screening in raising the efficiency of recruit training units. With this experimental background, it was not unreasonable to expect that the essential practicability of combining brief psychotherapy for enuretics with initial screening might be strongly indicated.

The effectiveness of this procedure is largely due to the timing and nature of the initial screening interview. Of prime importance is this early opportunity for the new recruit to disclose and re-

ceive help with his problem, motivated as he is toward success and by the stresses he has begun to experience in training. His unique receptivity at this early point in training is a crucial factor. It is believed that the "therapeutic" accepting attitude of the screening interviewer, being one of the first private contacts which the recruit has with an authority figure in a new setting, will tend to have a lasting positive effect.

With most persons the brevity of the interview is apparently no drawback to its effectiveness; nor is a rigid procedure a necessity. As this study demonstrates, significant results were achieved despite a flexible and individual application of therapeutic principles during a very brief period (about 3 minutes). The only attempt at uniformity involved a general acceptance of the necessity for a permissive attitude by the interviewers. Introduced strategically as it was, this resulted in sufficient anxiety reduction to effect a cessation of the habit in many borderline cases of enuresis. The procedural flexibility also had the important advantage of permitting the interviewer to "tailor" the treatment of each case according to his clinical judgment.

The effectiveness, brevity, and flexibility of this approach for handling enuretic recruits speak strongly for its usefulness in the military service. Incorporation into the regular screening routine is possible with little modification beyond emphasizing a psychotherapeutic orientation for the psychiatric staff. The statistics shown in table 1 imply a significant budgetary saving which may be augmented if further research makes it possible to reach beyond the borderline enuretic to effective treatment for less promising cases.

#### SUMMARY AND CONCLUSIONS

Research to date has tended to establish that psychotherapeutic screening for enuretics is both valid and useful. The following formulation expresses our current thinking as it has evolved from this work.

1. The permissive, interested and accepting attitude of the screening interviewer, a benevolent authority encountered by the recruit at a crucial time in his military training, is the foundation of this technic.
2. The recruit's positive motivation for overcoming the habit may be reinforced by appropriate behavioral suggestions concerning such things as liquid consumption, scheduled nighttime urination, et cetera.
3. Follow-up interviews are desirable in some cases, both to determine progress and to provide additional therapeutic support when necessary.

4. Therapeutic effectiveness is not based on the screening interview alone. The psychotherapeutic orientation of the entire psychiatric unit provides an atmosphere in which this procedure produces the best result.

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#### THE CHANGING PICTURE

In both Europe and America, in industrialized Western European civilization, there is evidence of a striking decline in the gross physical manifestations of hysteria, of the old major hysteria with large loss of motor or sensory functions. The symptoms of hysteria have become more modest, disguised and obscure, and we encounter more frequently hysterical features in many other disorders: anxiety states, character disorders, and such diseases as thyrotoxicosis, essential hypertension, colitis, vomiting in pregnancy, et cetera. There is statistical evidence also that these arbitrarily called psychosomatic disorders are showing a real increase in incidence not accounted for by more frequent diagnosis.

—WILLIAM A. HARVEY, M. D.  
in *Annals of Surgery*  
p. 137, July 1955

# THE RECOGNITION AND MANAGEMENT OF PSYCHIATRIC EMERGENCIES

CHARLES E. HERLIHY, *Lieutenant (MC) USN*

DEAN J. PLAZAK, *Lieutenant (MC) USN*

**M**ANY SITUATIONS that are referable to psychiatric conditions and that require prompt action on the part of medical personnel arise in the setting of a general hospital. It is essential that these emergencies be properly recognized and that the patient be referred for early and necessary psychiatric therapy. This preventive aspect remains a most important goal in the practice of medicine.

## SUICIDE

Perhaps the first word that comes to mind when one thinks of a psychiatric emergency is suicide. When a patient succeeds in taking his own life, the feelings of guilt engendered in the staff and family may be very great. There is always embarrassment to the hospital management, not to mention the blow to public relations in the community. Suicide occurs chiefly among the agitated depressed, disturbed psychotic, and delirious patients. At times there is no way of preventing one of these patients from taking his life, because of the swiftness with which he may act. On the other hand there often are clues suggesting that the patient may attempt self-destruction. Generally a patient will commit suicide when going into or coming out of a depression. These are times when psychomotor activity is sufficiently great to allow the patient to expend the energy required to complete the act.

Recognition of early depression is important. The most significant features are a decrease in psychomotor activity, an expression of hopelessness or despair, and talk of suicide. There usually will be a history of a withdrawal of interest from usual activities and an inability to make plans for the future. Loss of appetite and disturbance of sleep are also often prominent in early depression. The patient may have difficulty in falling asleep, but more often he awakes in the early morning hours. If agitated, he may pace the floor. This type of sleep disturbance is a serious sign, because many successful suicides occur in the early morning.

Multiple somatic complaints may be early symptoms of depression. One should get a base line of organic studies, at the same time investigating the life situation of the patient to learn something of his feelings about himself, his goals for the future, and his immediate associations. In the middle-aged patient the complaint of headache may also mask a depression. Management of this type of emergency requires interest in the patient and an attempt to get him to discuss himself instead of his symptoms.

It is well to talk with a member of the family close to the patient regarding his mood and behavior. A problem in the management of the depressed patient is the inherent danger in dispensing barbiturates for sleep disturbances. One must think of the possibility of patients saving barbiturates, remembering that only 10 to 15 times the hypnotic dose of most barbiturates causes death in the average person.<sup>1</sup> It is also important that the physician dispensing barbiturates on an outpatient basis knows fairly reliably how much sleep the patient is getting and what is happening to the medication. Often a member of the family should dispense the medication. It is wise in this respect to advise some member of the family that sleep disturbances frequently are forerunners of depression.

Any attempt at self-destruction must be looked upon with seriousness, because even the gesture of the immature or hysterical patient indicates a serious disturbance in personality and requires thorough evaluation. The suicide gesture usually is seen in the immature, emotionally unstable person or the hysterical personality who may slightly "nick" one or both wrists, take a little bit of iodine or bleach, or swallow three or four sleeping pills. These people hope by such behavior to gain something in their interpersonal relationships.

Once a potentially suicidal patient has been recognized, there are several important considerations in management. He should be placed in a private room with a special watch at all times. The room should be at ground level if possible. There should be a minimum of furnishings: a bed, a chair, and perhaps a night table. One can never be too cautious in removing all articles with which the patient might hurt himself—razor blades, knives, pointed instruments, strings, and ties of any kind. It is wise to avoid the use of drawstring pajamas and to remove shoelaces. The patient should never be left alone.

It is not necessary for the physician to be afraid to discuss suicide with his patient. It is often the physician's own anxiety that prevents this discussion. It may make a difference in management if he evaluates the quality of the attempt through the choice of method. This helps him to decide in the emergency room whether the patient will remain in the hospital or whether

he can be released. It may be more therapeutic and even advisable at times to release the immature person whose gesture has been an attempt to gain affection, love, or understanding. Recognizing some of these features may allow the physician to accomplish this without anxiety.

### ACUTE INTOXICATION

Intoxication may exist alone or accompany serious injuries or physical illnesses. The importance of a good physical examination cannot be overstressed. If a good objective history has not helped to identify the intoxicating agent, it is helpful to keep in mind three principal types of drugs: alcohol, bromides, and barbiturates. Routine evaluation of the intoxicated patient should include the examination of blood for all three.

On physical examination, in addition to the frequent appearance of excitement, loss of co-ordinated control, and combativeness, the intoxicated patient usually has injected sclerae and a characteristic breath odor; he also may be incontinent. It is not enough to send this type of person home to "sleep it off." Intoxication represents an acute physical illness and should be so treated. Acute alcoholic death is seen with greater frequency than is generally realized. One often reads in the newspaper of the alcoholic who dies in jail unattended. We show great concern for a child or an adult who has accidentally ingested some other toxicant, but we do not always have the same feeling about the victim of alcoholism. It is not remiss to take the patient to a quiet location, provide him with necessary personal attention, and administer intravenous fluids and vitamins in order to help detoxify him more rapidly.

Barbiturates have been included in the discussion of acute intoxications because of their widespread use and the frequency of acute barbiturate poisoning. It is a great temptation to give barbiturates in order to calm a patient or induce sleep. It is well to remember that in physically ill people smaller dosages are required for a hypnotic effect. In the emotionally ill patient a greater amount of drug may be required, and there is a great temptation to employ large dosages. It is imperative to recall the lethal dosage when dispensing barbiturates regularly to the same patient.<sup>1</sup>

An important factor to consider in handling acute barbiturate intoxication is the possibility of the acute withdrawal reaction. Physicians often fail to think of barbiturates as addicting drugs. A patient using large amounts of barbiturates will show a true physiologic reaction on withdrawal of the medication. One must be prepared for this because of the possibility of convulsions and psychotic reactions. If the patient does exhibit a withdrawal

reaction in the form of restlessness, twitching, convulsions, or psychosis, it becomes necessary to reduce the barbiturate dosage gradually, preferably using a different type of barbiturate from the one to which the patient has been addicted.

On physical examination the patient with barbiturate intoxication may show varying degrees of clouding of consciousness, slurred speech, and nystagmus. Reflexes may be normal or hypoactive, and he may not react to noxious stimuli. If the vital signs are stable and remain so over a period of 2 to 6 hours, no other treatment than gastric lavage, maintenance of an adequate airway, and intravenous nutrition is usually necessary. If the patient is in deep coma and vital signs are unstable, intravenous caffeine and sodium benzoate or amphetamine every two hours should be given. It is seldom necessary to use picrotoxin or metrazol (brand of pentylenetetrazol). Intravenous or intragastric feedings may be used. Penicillin given prophylactically is valuable because of the high incidence of pulmonary infections. Recently the use of electrostimulation and of specific chemical antagonists to the barbiturates has been described in the emergency treatment of acute barbiturate overdosage.<sup>2,3</sup>

Only 25 percent of patients with bromide intoxication have a bromide rash. These patients more frequently show evidence of increased lacrimation and salivation, marked mental aberration with incongruity of thinking, and unusual, bizarre visual hallucinations. The blood bromide level will usually be elevated above 150 mg. per 100 ml.<sup>4</sup> If possible, it is well in bromidism to use oral medication at first, because too rapid introduction of sodium chloride will cause bromides to go from tissue to blood, thereby elevating the level and causing symptoms to persist. Mercurial diuretics during the first 48 to 72 hours often will aid materially in eliminating the bromide.

Acute amphetamine intoxication is worthy of mention because of the widespread use of this seemingly harmless stimulant. Following excessive use of an inhaler or after ingestion of tablets there may be restlessness, tremors, insomnia, talkativeness, and irritability. In children, confusion, delirium, and hallucinations have been observed. Following excessive oral ingestion, anorexia, nausea, vomiting, and diarrhea may occur; and convulsions, circulatory collapse, coma, and death may follow. Treatment generally consists of gastric lavage and symptomatic care. With marked overdosage, use of luminal sodium (brand of phenobarbital sodium) may occasionally be indicated, but it is cautioned that, in children especially, this may add to the patient's excitement and irritability.

The excessive use of aspirin and antihistamines is frequently of acute intoxication, especially in children; and a vari-





of this type, is interesting as a social problem. This illness frequently becomes a matter of personal concern to the physician, either when it occurs in his own family or in the families of friends and patients who come to him for general advice.

Organic mental syndromes occasionally present a picture calling for emergency measures. These are characterized by excitement, disorientation, and confusion. Simplification of the environment and judicious use of sedatives such as chloral hydrate, paraldehyde, and more recently chlorpromazine hydrochloride constitute the treatment of this syndrome. These disorders frequently produce anxiety in relation to specific occurrences in behavior. Isolated episodes of peculiar behavior, such as a brief flurry of paranoid ideas, an unusual or aberrant sexual act, or confusion in solving a life situational problem, are much more common representations of the beginning of an organic mental syndrome than is a progressive loss of ability to remember, or a deterioration of personal habits.

A careful evaluation of this type of disorder in its incipient stages may be of value in helping those who surround the patient to adjust to the condition, and to assist him in a more orderly adjustment to the continuum of deterioration. The administration of such agents as metrazol in small dosages is of definite value in assisting with this adjustment. Each patient must be evaluated carefully as to need for various types of care. Many times the personal anxiety of the patient's associates over such a syndrome may far outweigh the severity of the disorder itself.

It is important to keep in mind the group of disorders known as the senile dementias. Such disability, ordinarily expected well after the age of 60, may begin in the fifth or sixth decades; it is more often detected in the military setting because of frequent close physical scrutiny of personnel. Patients with this type of illness require a very thorough neuropsychiatric evaluation.

#### ACUTE FUNCTIONAL EMOTIONAL DISTURBANCES

Acute emotional disturbances of functional origin are characterized by loss of adequate behavioral or thinking control. This loss may be manifested by an uncontrolled excitement of varying degree or by a severe inhibition. The latter condition includes the acute hysterical conversions. This type of disorder is frequently observed by a physician in a dispensary or emergency room. By its very nature, that of loss of control, it often creates considerable anxiety in the attending staff. It is important that this anxiety does not lead the physician to use hasty and erroneous methods in handling such disorders. One example of this, frequently observed, is the immediate placing of an excited patient in complete restraint before any evaluation is carried out; here is the equally hasty procedure of giving the patient

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sedatives without first determining what is represented by the disorder. The possibility that such an acute excitement may have resulted from either head injury or severe internal injury causing a toxic condition should always be considered.

The best initial approach to a disorder of this type is the use of all perceptive senses. Observe the behavior of the patient. Listen to what he has to say with attention, not so much to the words themselves as to the fashion in which they are spoken and used. A careful evaluation of the symptoms is valuable. The time of onset and quality of the symptoms are often helpful in diagnosis as, for example, in stocking-glove anesthesia or in sudden onset of aphonia or tunnel vision. The quality of the emotional expression, the way in which the story is told, is helpful in that the patient often is not at all concerned over the symptoms that he describes. He does not show the anxiety and feeling about his symptoms that an organically ill patient invariably has.

The second important step is an adequate chronological history. This history is not always obtainable *in toto* from the patient, but there generally is someone, if we take the time to find him, who knows something of the onset of the disorder and has an idea of what the patient's previous difficulty has been. The absence of physical findings to substantiate the complaints presented is an important factor in determining the causes of the disorder.

One should bear in mind that episodes of behavioral excitement, sometimes associated with organic complaints, are extremely common. They often represent transient situational behavior in response to specific stress, which by no means implies a serious continuing mental disturbance. Sometimes one will be able to elicit a history of the previous occurrence of such episodes.

In the treatment of these disorders it is most helpful to show an interest in the patient; to listen to him, watch him, talk with him. As a corollary of this, the physician should avoid becoming anxious or excited in his approach to the problem. If this occurs, it increases the anxiety and excitement of the patient, and reduces his confidence in the physician. An interested and calm approach to the patient will often result in the cessation of his behavior and abrogate the need for further immediate therapy. If it does not, the physician must still, with the same calm approach, consider the use of appropriate sedation or restraints. In this matter, his real professional capacity and ability to handle people reveal themselves to all concerned.

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It is important to keep in mind the group of disorders known as the presenile dementias. Such disability, ordinarily expected well after the age of 60, may begin in the fifth or sixth decades; it is more often detected in the military setting because of frequent close physical scrutiny of personnel. Patients with this type of illness require a very thorough neuropsychiatric evaluation.

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A factor which might contribute to the physician's anxiety in this connection is his own livelihood, which invariably enters

into the handling of any patient. In the military setting physicians are, uniquely, not particularly bound by these problems. It is possible to be perfectly frank and honest with the patient in referring him for needed help and in discussing with him the emotional import of his disturbance. This honesty with the patient is often sufficient therapy. He often fully recognizes that his is an emotional difficulty and is only looking for the understanding reassurance of someone who is interested enough to help him through the episode.

Placing a patient with a conversion paralysis in a "straight-jacket" or leather cuff restraints, or even placing a patient with a marked excitement in such a situation without first discussing the matter with him, belies the common-sense approach in dealing with emotional problems. When restraints are necessary, sheets used in the fashion of a wrap-around are often sufficient to assist the patient in overcoming a generalized physical excitement.

Sedation should be used only after obtaining a fairly accurate appraisal of the patient's difficulty. This necessitates discussion of the difficulty with him and an adequate explanation to him of why one is going to use sedation. One of the most effective sedatives is a combination of 1.5 mg. of apomorphine hydrochloride and 0.4 mg. to 0.6 mg. of scopolamine hydrobromide administered by hypodermic injection. The scopolamine may be repeated at intervals of from 3 to 5 hours as necessary. Occasionally this may cause vomiting, but in general one finds that it works well even in acutely disturbed psychotic patients.

The extremely disturbed or violent patient calls for a different approach. One should certainly avoid all semblance of aggressiveness in approaching the patient. It is a well-known fact in mental hospital practice that a firm approach to the patient with appropriate explanation, using a show of adequate personnel and without the use of physical force or restraint of any kind, frequently will quiet the patient because he recognizes the respect for his very disturbed state. Involvement in fights, or aggressive actions and verbalizations toward the patient, indicate only our own fear of inability to deal with the problem.

#### SUMMARY

Suicide, acute intoxication, delirium, organic mental syndromes, and acute functional emotional disturbances have been discussed with reference to their specific treatment or management in a general hospital.

Successful suicide attempts occur chiefly among the agitated and disturbed psychotic, depressed, and delirious patients. Recognition of early depressive symptoms is an important preventive measure. Suicide gestures are important indicators of underlying emotional disturbance.

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Complications in treatment of organic and functional illnesses are sometimes referable to injudicious use of barbiturates. Bromide or amphetamine intoxication requires prompt recognition for effective treatment.

Alcoholic intoxication should be treated as a serious illness. The mortality rate in delirium tremens is higher than often recognized. More important than withdrawal as a causative agent is intercurrent trauma or illness in a heavy drinker. Prompt use of intravenous fluids often results in a more rapid recovery. Delirium associated with physical illness will abate with recovery from the organic disease.

The attitudes and feelings of persons concerned with patients who have organic mental syndromes need to be recognized as factors in the therapy of the patient.

Careful evaluation of the history of acute functional emotional disturbance and close attention to the verbal and behavioral productions of the patient will assist in making the correct diagnosis. The necessity for medical personnel to recognize the role of their own feelings as they arise in the management of these problems is considered paramount.

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Don't confuse hypothesis and theory. The former is a possible explanation; the latter, the correct one. The establishment of theory is the very purpose of science.

—Martin T. Fischer

# CONGENITAL IMPERFORATE ANUS

LUTHER G. BELL, *Captain (MC) USN*

FRANCIS M. SMITH, Jr., *Lieutenant Commander (MC) USNR*

**C**ONGENITAL imperforate anus is an abnormality that, unless associated with an adequate fistulous tract to the outside of the body, is incompatible with life. This lesion is one that can be adequately treated by the general surgeon who is aware of the basic principles involved in the surgical repair of this disorder.

In the past 5 years there have been 10 patients with congenital imperforate anus treated at this hospital. To these have been added two cases seen by the junior author during this period. The 12 cases reviewed in this report are summarized in table 1.

## DIAGNOSIS

Obviously the diagnosis is made by simple inspection. Physical examination of the newly born infant should identify the lesion of imperforate anus prior to the onset of any suggestive symptoms. Imperforate anus is also often detected when the nursery attendant is unable to insert a rectal thermometer. In the female an associated rectovaginal fistula may prove to be a pitfall. There have been cases on record of these going several years without being recognized.<sup>1</sup>

## PREOPERATIVE MANAGEMENT AND EVALUATION

As soon as this lesion is recognized, plans should be made at once for early surgical correction. Careful planning means full and rapid evaluation of the infant. At no time in the neonatal period is a full term infant better equipped to withstand the shock of operation than in the first few days of life. He is in a state of optimum fluid and electrolyte balance that can do nothing but deteriorate progressively with each day of delay.

The first step in the evaluation of the infant with an imperforate anus is to look for other associated congenital anomalies.<sup>2</sup> Congenital abnormalities are usually multiple rather than single. Because of the close relationship in the embryologic development of the cloaca and the urogenital sinus, associated anomalies most frequently are found in the genitourinary tract.

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From U. S. Naval Hospital, San Diego, Calif.





The most common associated lesions of the genitourinary tract are rectovesical fistula and recto-urethral fistula.<sup>2</sup> If there is a fistula between the bowel and the genitourinary tract, a voided specimen of urine may reveal gross evidence of meconium. A centrifuged sample may show lanugo hair and cornified epithelial pearls. Once this has been demonstrated, a No. 8 Foley catheter should be introduced into the bladder. A clear specimen of urine from the bladder plus a meconium-contaminated specimen of voided urine should favor the presumptive diagnosis of recto-urethral fistula.

In the female a rectovaginal fistula may occur. These are most frequently found near the fourchette.<sup>2</sup> In patients of either sex a rectoperineal fistula may occur. In the female it opens between the rectal dimple and the vagina. In the male the opening is at the base of the scrotum or along the raphe perinei. Depending on the patency of the tract, meconium may or may not be seen to exude from this opening. In Gross's<sup>3</sup> series, recto-urethral fistulas occurred in 11 percent, rectovesical fistulas in 10 percent, rectoperineal in 20 percent, and rectovaginal in 25 percent of his patients.

Other congenital anomalies may frequently be associated. Gross's series reveals that 198 of 507 patients, or 39 percent, had other associated anomalies. Some of these may take precedence over the imperforate anus. High gastrointestinal tract atresia is an outstanding example. Atresia of the esophagus with associated fistula to the pulmonary tree may co-exist with imperforate anus. Obviously, these lesions must be coped with first. Atresia and stenosis of the small bowel may be present. In short, it may be stated that the first step should be an evaluation of the patency of the gastrointestinal tract above the rectum.<sup>2</sup> Perhaps the simplest method by which to obtain this information is the roentgenographic studies suggested by Wangenstein and Rice.<sup>4</sup>

Anteroposterior and lateral views are made with the infant in the inverted position, and a radiopaque marker is placed over the anal dimple. If air is found throughout the gastrointestinal tract and in the large bowel, the patency of the gastrointestinal tract can be assumed with but one exception, this being esophageal atresia with a fistula between the distal segment and the pulmonary tree. Other important information obtained from this study is the distance between the rectal air column and the anal dimple as identified by the radiopaque lead marker. When the end of the bowel lies far up in the pelvis it should at once suggest the possibility of a recto-urinary tract fistula.

Next, one's interest should be centered on possible cardio-pulmonary lesions. In one of our cases an infant had a completely

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unexpanded right lung due to a developmental defect which had resulted in a lung bound down by pleural membranes. Congenital cardiac malformations are fairly frequently associated lesions. This lesion occurred in 8 percent of the patients in Gross's series and in one of ours. Careful auscultation of the heart plus routine roentgenograms of the chest should be a part of the evaluation of these infants. If a congenital cardiac lesion is found, careful attention must be given to intravascular administrations of fluid. Occasionally atelectasis may be encountered. This was observed in two of our patients. When marked, atelectasis can affect the patient's condition so severely that definitive surgery must be delayed and palliative measures undertaken.

The second step should consist of measures to prepare for operation. In the cases diagnosed early, that is, in the first 24 hours of life and in full term infants, no fluids need be administered preoperatively. However, no infant should be operated on without a "cut-down" site available for the administration of fluid and blood to combat shock. Blood should be available in the amount of 20 ml. per kilo of body weight, to be given during operation if needed. If a combined abdominoperineal or perineal approach is anticipated by the surgeon, the cut-down site should be in the antecubital area. In cases diagnosed or seen late, signs of obstruction are likely to have complicated the picture. Nasogastric suction should be instituted in these patients prior to operation. All material aspirated should be measured and taken in account in the postoperative management of fluids. In general, one may safely replace this aspirated fluid with normal saline solution in addition to the calculated fluid volume for a 24-hour period.<sup>2</sup> In those cases where an external fistula exists, an attempt should be made for thorough cleansing with normal saline. This is best done with a catheter of suitable size for the fistulous tract. The meconium can be considered aseptic for 24 to 48 hours and no antibiotic to combat gastrointestinal infection need be given preoperatively. Conversely, in late cases, it is desirable to give a broad-spectrum antibiotic 24 to 48 hours prior to operation. With the use of a suitable antibiotic one can gain not only adequate gastrointestinal tract sterilization but also have adequate systemic protection against infections. All patients should be sent to the operating room with an indwelling catheter in the urinary bladder.

## OPERATIVE APPROACH

The operative technic for imperforate anus has been well documented in discussions of congenital abnormalities of the rectum to which the reader may refer.<sup>1,4</sup> In view of this, we will avoid operative details and discuss the operative approach.

The average qualified general surgeon may not be called upon to treat more than a few such patients in a lifetime. As a result, although technically capable, he may err in selecting the surgical approach.

In our experience, too many patients have been operated on from the perineal route alone and too many colostomies have been done. Although both approaches are logical, the condition of the patient should dictate the choice of approach. Colostomies should be reserved for the poor-risk premature infant and for those with other congenital abnormalities of a more serious nature that take operative preference over the rectal lesion. When a colostomy is done, we suggest that it be in the left transverse colon rather than in the sigmoid area. If a genitourinary fistula is present, the bowel should be transected and the ends widely separated to prevent spillage of bowel content in the lower segment, thereby reducing the chance of urinary infection. Sigmoid colostomies may seriously interfere with the rectal pull-through when the definitive procedure is performed. This complication prolongs the operation and is an added risk to the patient. Case 12 in our group presented this difficulty. The bowel had prolapsed and had to be resected in order to complete the perineal procedure; this possibly accounted, in part, for the cardiac arrest and the patient's death.

The perineal approach is a very satisfactory one but should be used only after the problem has been well analyzed. It is suitable for the imperforate anal membrane, low rectal pouches lying within 1 and not more than 2 cm. of the skin, short perineal fistula, and low rectovaginal fistula. We believe that in every instance where the success of this procedure is in doubt, it should be decided preoperatively whether or not the patient can stand the combined procedure if necessary.

The combined abdominoperineal operation should be used where the rectal pouch ends blindly 2 cm. or more above the skin. It should be used in practically all recto-urinary fistulas and in high rectovaginal fistulas. It is also necessary in cases where the anus and anal pouch are normal and the rectal pouch ends blindly in the hollow of the sacrum.

If these principles are followed and executed with meticulous technic, the results of the correction of this congenital anomaly should continue to improve. The margin of error in performing this operation is small, but the procedure must be done correctly the first time if a good result is to be obtained.

#### POSTOPERATIVE MANAGEMENT

Antibiotics should be administered for from 7 to 10 days postoperatively. During the first 24 to 48 hours fluids are given intra-

vascularly and the intravenous drip is continued in event of shock. We found in our series that aspiration is a serious complication, having occurred in 3 of 12 patients. We would advise nothing by mouth for 36 hours, at the end of which time the infants have usually recovered fully from the anesthetic. The first few feedings should always be sterile 5 percent dextrose in distilled water, so that in the event of vomiting and resultant aspiration the danger of chemical pneumonitis is less than with a milk formula. Adequate sedation is mandatory in the immediate postoperative period to prevent struggling and straining which may break down the surgical correction.

An excellent formula to begin these infants on is one made of one-half part skimmed milk plus one-half part whole milk with 18 percent carbohydrates added. This gives a low fat and high carbohydrate, high protein feeding that will be more conducive to soft stools.

When the perineal suture line is well healed, cautious rectal dilations should be instituted, if necessary. These are continued until such time as an adequate function is ensured. The mother can be instructed in digital dilatation of the rectum, to be done at least three times weekly. Throughout the first year of life the condition of these infants should be followed by both the surgeon and pediatrician working in close accord. Careful attention should be given to diet and nutrition. Perhaps the most important single factor in management is the avoidance of constipation. When fecal impaction occurs in these patients, it is extremely difficult to cope with. One of our patients had an impaction so severe that surgical removal of the feces via an abdominal approach was necessary. None of our cases have been followed long enough to evaluate the anal function. However, we believe it important to caution the parents that there probably will be much to be desired in anal sphincter control.

#### SUMMARY

Congenital imperforate anus, in most cases discovered in the first few hours or days of the infant's life, should be surgically corrected as early as possible. The presence of other anomalies such as rectovesical or recto-urethral fistula, as well as defects in development in other parts of the gastrointestinal tract, should be ascertained preoperatively by clinical and roentgenographic examination.

The operative approach and pre- and post-operative management should be dictated by the number and types of anomalies encountered and by the age and condition of the patient. Post-operative follow-up should continue for at least a year, and should include measures to prevent fecal impaction. Conclusions

drawn from a series of 12 cases reviewed by the authors have been presented, with the aim that they will be of some aid to the military surgeons who will ever increasingly be called upon to manage these types of lesions.

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#### TREATMENT OF PSYCHOSOMATIC DISORDERS

Every patient coming to a physician with complaints has usually interpreted them to himself in terms of specific organic pathology. He, therefore, expects a certain amount of history taking, a complete physical examination, appropriate laboratory studies, and a prescription. In the initial interview of one and one-half hours, the amount of time to be devoted to history taking and physical examination can usually be determined by the experienced clinician after the first 10 to 15 minutes. By that time, his impressions as to whether the patient's symptoms are predominantly organic or emotional in origin have been formed. In the event of frank organic disease or a diagnostic problem, a detailed medical history and physical examination is essential, and may well utilize all the allotted time. In the case of a patient with symptoms which appear to be predominantly emotional in origin, the same complete study should be carried out, but had best not be attempted in the one and one-half hours allotted to the initial interview. It is of primary importance to this situation that the latter patient be encouraged to speak freely at the first meeting, express his anxiety about his symptoms and what he thinks is the matter.

—HERBERT L. HARRIS, M. D., and  
CAREY M. PETERS, M. D.

in *American Practitioner and Digest of Treatment*  
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to identify and correct the deficient sanitation in the mess which caused the outbreak and which, if long uncorrected, could promote the spread of more serious food-borne disease.

2. *The surgeon telephones the Commander of Baker Company to arrange to have the entire company available, starting at 1000 hours, for questioning; to get men from the company to help with the questioning; and to arrange for an immediate inspection of the mess.*

If only Baker Company men have experienced diarrhea, it will probably be found that this company operates its own mess and messes separately.

It is of the utmost importance to question as many men of the company as possible—those “not ill” as well as those “ill” (these terms are used in their epidemiologic and not necessarily their clinical meaning). “Well” and “not ill” are used interchangeably, as are the terms “ill” and “case.” Suppose, for instance, that the vehicle for the offending micro-organism was a pudding, which was eaten by most of the men in the company, for example, 90 per cent. If only 40 men were interrogated, 20 of them from among those ill and 20 from among those well, it might well happen that none of the 20 ill men failed to eat the pudding and that only 4 of the 20 well men failed to eat it. (Note that in this group of 40 men, 36, or 90 per cent, ate the pudding and 4, or 10 per cent, failed to eat the pudding.) This looks like pretty strong evidence against the pudding, but it can be shown by the chi-square test (described later) that the association between eating the pudding and getting sick in this particular group is not a statistically significant association. Suppose, however, that instead of interrogating 40 men out of the company we interrogated 200 men and found that among 80 ill men in the group none had failed to eat the pudding, while of the 120 well men there were 20 who did not eat it. (Here again 90 per cent of the men ate the pudding and 10 per cent failed to eat it.) We would now have valuable evidence to incriminate the pudding, because it can be shown by the chi-square test that there is in these data a highly significant association, statistically speaking, between eating the pudding and becoming ill. Unless some other explanation is found to account for this association, the evidence indicates the pudding as the source of the outbreak.

The investigation must keep the men of the company away from their duties for as short a time as possible. Also, the sooner the interrogation is undertaken, the more reliable will be the answers. For these reasons, men of the company are used as interviewers. If a good questionnaire is developed, like that illustrated in figure 1, and if men of average or higher intelli-



the way to correction of the breach of sanitation. Diarrhea occurs so frequently and is so widespread in the military service that it would be impossible, if indeed desirable, to have every outbreak investigated by a specialist.

The system described in this article has been worked out through application in several diarrhea outbreaks in U. S. Army and Labor Service units in Munich, Germany, over the past few years. We found that, for efficiency and to save time for the investigating personnel and for the company under study, numerous details had to be attended to simultaneously. Full use had to be made in each outbreak of lessons learned and techniques developed in preceding outbreaks. Thus, we developed a check list of things to be done, forms to be reproduced, persons to be contacted, et cetera, lest some detail be lost from sight and doom the investigation to certain failure, or obstruct and greatly prolong it. This article consists essentially of the presentation of this check list, with a brief discussion of each step and explanation of the relatively simple statistical calculations required to identify the offending food item in those instances when this cannot be done with the required certainty through simple inspection of the catalogued and compiled entries from the individual questionnaires and food sheets. It is our hope that physicians in the military service will not simply read this article, then lay it aside and be unable to find it again, but that they will use it to guide their epidemiologic investigations when confronted with an outbreak of diarrhea.

The essential steps in this system of epidemiologic investigation are presented in their proper chronological order in *italics*, and those requiring further explanation and discussion are treated in the order of their appearance. Where needed, sample forms and statistical tables illustrate the steps. To achieve greater reality in presentation, this system is applied to an imaginary outbreak of diarrhea in a mythical "Company B" ("Baker").

#### PROCEDURE FOR INVESTIGATION

On Saturday morning at 0800 hours several men of Baker Company appear at sick call with the chief complaint of diarrhea.

*1. The medical officer in charge of the dispensary, hereinafter referred to as "the surgeon," questions patients to determine whether there is really an outbreak and, if so, to learn the approximate hour of onset in the first case.*

In outbreaks of mild diarrhea, relatively few of the men affected report on sick call. Unless the surgeon has a sufficiently high index of suspicion to make inquiry, he might fail to learn that an outbreak has occurred. Any outbreak of diarrhea, regardless of its mildness and limited extent, should be investigated

to identify and correct the deficient sanitation in the mess which caused the outbreak and which, if long uncorrected, could promote the spread of more serious food-borne disease.

*2. The surgeon telephones the Commander of Baker Company to arrange to have the entire company available, starting at 1000 hours, for questioning; to get men from the company to help with the questioning; and to arrange for an immediate inspection of the mess.*

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The investigation must keep the men of the company away from their duties for as short a time as possible. Also, the sooner the interrogation is undertaken, the more reliable will be the answers. For these reasons, men of the company are used as interviewers. If a good questionnaire is developed, like that illustrated in figure 1, and if men of average or higher intelli-

"M" Mess (mess at which the group struck by the outbreak ordinarily eats and/or presumably ate during the incubation period of the disease featuring in this outbreak).

"S" day (date on which symptoms first appeared in the first case properly classed as a part of this outbreak, not a coincidental case).

INSTRUCTIONS: Use 24-hour time, e. g., 0900 for 9:00 a. m.; 1500 for 3:00 p. m. Question every individual regardless of whether he is sick, has been sick, or remained well. Be sure he understands each question. If he IS NOT SICK or WAS NOT SICK, delete by diagonal lines and omit question 3 to 7 inclusive and question 12.

1. Questionnaire filled out on \_\_\_\_\_, 19\_\_\_\_ at hour \_\_\_\_\_
2. \_\_\_\_\_  
(Last name) (First name) (ASN) (Unit)
3. Place an X after each of the following symptoms suffered:  
Sick at stomach \_\_\_\_\_ Bowels loose \_\_\_\_\_ Shaking chills \_\_\_\_\_  
If so, state \_\_\_\_\_  
Vomiting \_\_\_\_\_ number of movements \_\_\_\_\_ Belly gripes or cramps \_\_\_\_\_
4. Other symptoms (list them) \_\_\_\_\_  
\_\_\_\_\_
5. Which symptom appeared first? \_\_\_\_\_ Exact hour and date \_\_\_\_\_
6. Did your sickness begin suddenly? \_\_\_\_\_ Was it severe? \_\_\_\_\_
7. Are you still sick? \_\_\_\_\_ If not, how many hours were you sick? \_\_\_\_\_
8. State hour at which you ate each of the meals you had at "M" Mess on \_\_\_\_\_, 19\_\_\_\_ ("S" day)  
Breakfast \_\_\_\_\_ Dinner (lunch) \_\_\_\_\_ Supper \_\_\_\_\_
9. Indicate by an X in appropriate space which of the meals you had at "M" Mess on \_\_\_\_\_, 19\_\_\_\_ (the day before "S" day).  
Breakfast \_\_\_\_\_ Dinner (lunch) \_\_\_\_\_ Supper \_\_\_\_\_
10. Indicate by an X in appropriate space which of the meals you had at "M" Mess on \_\_\_\_\_, 19\_\_\_\_ (the day before the day before "S" day).  
Breakfast \_\_\_\_\_ Dinner (lunch) \_\_\_\_\_ Supper \_\_\_\_\_
11. Indicate by an X in appropriate space which of the meals you had at "M" Mess on \_\_\_\_\_, 19\_\_\_\_ (the day after "S" day).  
Breakfast \_\_\_\_\_ Dinner (lunch) \_\_\_\_\_ Supper \_\_\_\_\_
12. Did you eat at any place other than "M" Mess during period \_\_\_\_\_ to \_\_\_\_\_, 19\_\_\_\_ ("S" day, the day before "S" day, and the day before the day before "S" day)? If so, indicate below where you ate, what you ate, and at what time: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

REMARKS (Indicate to which question each refers) (Continue on reverse side):  
\_\_\_\_\_  
\_\_\_\_\_

(Signature of interviewer)

Figure 1. Individual questionnaire for investigation of diarrhea outbreak.

gence are used as interviewers and instructed beforehand in the use of the questionnaire, data can be obtained as reliable as the trustworthiness and memory of the men interviewed will permit.

To ferret out the cause of an outbreak and to determine the manner in which it operated, it is necessary to identify as many as possible of the ill persons who form a part of the outbreak in question. It is more important that no man be listed as ill when he is not than that every ill person be listed. For this reason, gross symptoms—for example, vomiting, diarrhea, and cramps—are inquired into by means of the questionnaire. Lay interviewers, making use of questionnaire forms worded in simple, readily intelligible language, can after brief instruction elicit fairly reliable answers as to gross symptoms experienced. As a further safeguard against including "false positives" as ill patients, incontrovertible criteria, such as passage of two or more stools or vomiting, are set up for determining who of the men are ill. Such qualifying criteria will, of course, miss patients with mild but epidemiologically bona fide illness—for example, those with only nausea or abdominal cramps. However, these safeguards will tend to prevent including as ill those men who, by the power of suggestion, might report as symptoms of sickness such physiologically normal phenomena as hunger pains, borborygmi, and postprandial gastrocolic reflex.

If one is obliged to choose between a small number of questionnaires carefully completed by physicians or other medical experts and a much larger number of questionnaires less accurately completed by hastily recruited and trained lay assistants, one should elect the latter, at least when one is dealing with a diarrhea outbreak, because it is necessary only to be sure that every man listed as ill really is ill, and to learn which items of food every man in the study ate. These conditions can be fulfilled through observing the precautions outlined in this article.

*3. The surgeon makes the necessary changes in the questionnaire, as illustrated in figure 1, to adapt it to serve a particular outbreak, and has sufficient copies reproduced.*

*4. The surgeon contacts the laboratory and requests necessary culture media and service.*

It is suggested that enough tubes and plates of media be obtained to culture 30 specimens, half of them for pathogenic gram-negative enteric bacilli, and half for gram-positive cocci.

*5. The surgeon dispatches a messenger to pick up the culture media.*

6. *The surgeon then proceeds to the mess to learn certain things about the composition and preparation of meals served during the "period of greatest probability" (explained below) and to conduct a sanitary inspection.*

The following are some of the things he does:

(a) Requests that any leftover food be placed in the refrigerator and left there, untampered with, until the surgeon indicates other disposition.

(b) Inspects the master menu for each meal served in the mess during the "period of greatest probability."

(c) Writes down the ingredients (particularly leftovers) that went into each food and beverage served at each meal during this period; when and how each food and beverage and their ingredients were prepared and handled; how long each of these items was left unrefrigerated after, or at any time during, its preparation; and any other information that might give a clue as to the possibility of pathogenic micro-organisms from human or animal sources being implanted on, or allowed to propagate in, any food or beverage or any ingredient thereof.

(d) Inquires carefully if any "extra" item of food or beverage was served at any meal during the period in question either as a substitute for, or supplementary to, foods and beverages listed in the master menu. Writes down the required detailed information for each such "extra" item.

(e) Records the identity of each person who in any way took part in preparing or serving any food or beverage served during this "period of greatest probability" and causes each such person to be subjected to such interrogation and physical and laboratory examinations (see step 13 below) as may be necessary to determine if at the time he engaged in handling any of those foods or beverages he could have carried the micro-organism of the disease featured in the outbreak.

(f) Records details of any sanitary deficiencies which he learns occurred in the mess within the past several days, *e. g.*, interruption of refrigeration, lack of hot water, lack of soap or other detergent, prevalence of flies or vermin, et cetera.

(g) Conducts a thoroughgoing sanitary inspection of the mess and premises, checking particularly such things as the temperature of the dish water; the temperature and cleanliness of the refrigerator and the condition of its contents; methods of preparing and serving food; prevalence of flies; signs of rats, mice, roaches; and personal hygiene practices on the part of food handlers.

7. The surgeon then has food sheets made and reproduced like that illustrated in figure 2.

Outbreak beginning on \_\_\_\_\_ 19 \_\_\_\_\_ among patrons of mess of \_\_\_\_\_

[illegible]

**Figure 2. Food sheet for investigation of diarrhea outbreak.**

Findings obtained through step 6 guide the preparation of the food sheets and dictate which items of food and drink are to be entered in its headings. Across the top of the sheet are listed the individual foods and beverages (grouped by meals) served during each meal in the "period of greatest probability," and merely the name of each meal (not items served) for 24 hours preceding that period. It is of the greatest importance that all foods and ingredients be listed which are likely to serve as the vehicle for diarrhea-producing micro-organisms. Other foods such as bread, sugar, black coffee, sugar syrups, dry cereals,

et cetera, need not be listed except when they merit suspicion in conjunction with other food. For instance, where appropriate, instead of listing "coffee," list "cream (in coffee)," and instead of listing "canned peaches," list "whipped cream (on canned peaches)."

8. *The surgeon next organizes his staff, including the men lent him by Baker Company, into two interviewing teams, one to complete the individual questionnaires, illustrated in figure 1, and the other to complete the food sheets, illustrated in figure 2.*

9. *The surgeon then thoroughly instructs the interviewers.*

He reads and explains to them the entries in the forms and impresses them that they must ask each question carefully, and must make sure that each man interviewed answers as accurately as his recollection permits, to make it possible to classify all men as "ill" or "well" (in the epidemiologic sense) and to learn which items of food and drink each man consumed.

10. *The surgeon arranges to have rooms fitted out to serve for the interviewers, with a table and two chairs for each interviewer. Those filling out the individual questionnaires should operate in a room separate from those filling out the food sheets.*

11. *As groups arrive to be interviewed, each should be under the control of a company noncommissioned officer, who directs the men quietly to enter one or the other of the interview rooms when required, and to go to the next room for the second interview when finished.*

It does not matter which interview is done first. Any person whose answers to questions 8 through 10 indicate that he has not eaten a meal at the mess during the period covered by the questionnaire is promptly dismissed and excluded from the study. However, of the group that did eat a meal at the mess during this period, both ill and well persons have to be subjected to both interviews.

12. *The surgeon supervises the interviewing while it is in progress, to ensure that the proper questions are asked and answered in the correct manner, and that the entries are correctly written.*

13. *The surgeon selects typical patients and suspected mess personnel for bacteriologic examination of their stool specimens.*

The contributions made by the laboratory toward determining the causative organism in "run-of-the-mill" diarrhea outbreaks vary greatly. Generally, the laboratory results are disappointing, possibly because the offending organism is so often ubiquitous

and indistinguishable culturally from nonpathogenic members of the group to which it belongs. Another possible reason is that an insufficiently wide assortment of culture media are used to isolate and identify every possible offending organism, whatever be the group to which it belongs. For instance, media which would promote the growth and identification of bacteria of the salmonella group might not support the gram-positive cocci, and vice versa. Often to blame is lack of sufficient competence and interest on the part of personnel taking and handling specimens and on the part of laboratory personnel examining them.

The evidence incriminating a particular food as the cause of an outbreak of diarrhea is generally at best circumstantial, but the greater the volume and reliability of such evidence, the better. The proof that the suspected item of food caused the outbreak is satisfactorily established by finding a diarrhea-producing organism in that food, the same organism in the stool, secretions, or lesions of a person known to have handled that food and in the stools of persons known to have eaten that food. However, less substantiating evidence will do. The *sine qua non* for incriminating a food is *not* that it be found to contain a diarrhea-producing organism, *nor* that this organism, if found in the food, also found to be harbored by a handler or consumer of the food. The *sine qua non* is that it be shown that none became ill who did not eat the suspected food and that all who became ill ate the suspected food. It is not necessary to prove that all who ate the food became ill, inasmuch as individual persons vary in susceptibility, some will eat more than others, and the causative organisms may be so dispersed in the mass of food that not every serving will contain them, or enough of them to produce disease. The epidemiologic investigation, therefore, can yield findings which, unsupported by laboratory findings, can indicate which item of food caused the outbreak. This investigation can at times also indicate the identity of the offending organism, how and by whom it was implanted on the food, and how, once implanted, it was able to multiply.

14. *In order to facilitate the study, the surgeon has the food sheets attached together to make one long sheet or series of long sheets.*

15. *The surgeon then studies Baker Company's completed questionnaires and classifies each man as "ill," "not ill," or "questionable."*

The severity of illness, as mentioned before, is unimportant for epidemiologic purposes. Clinically questionable cases will occasionally be observed which defy hard and fast classification. Such cases should be excluded from the study, their names and food data crossed off the food sheets, and their questionnaires removed from the others.



Having once classified a man, the surgeon must not change his classification, however strongly tempted by later findings to do so. An example would be his classification as ill of a man who reported not having eaten the food most strongly suspected of causing the outbreak. Such a discrepancy might be attributed to one of two things: that the man answered incorrectly deliberately, or because he did not understand the question, or because his memory did not serve him right; or that his was a coincidental illness and not epidemiologically a case belonging to the outbreak. Such cases which patently do not fit the pattern can, in fact, rightly be considered and reported as not belonging in the outbreak, provided care is taken to avoid bias. In other words, incorrect replying should not be assumed expressly either for the purpose of incriminating or exonerating a particular food. Furthermore the number of ill persons labeled "coincidental" cases should not be greater than corresponds to the "normal" incidence of the disease (in this study, diarrhea) among the group. In other words, out of an American company located in Germany, for example, one or even two endemic cases of diarrhea can be expected to occur, on the average, every day, including the day on which an epidemic of diarrhea occurs. But it would be bias to label five cases as "endemic," that is, "coincidental," merely in order to avoid weakening the evidence against the food most strongly suspected of causing an outbreak.

*16. The surgeon numbers each man according to his place on the combined food sheets and enters this number on the man's questionnaire. A red "X" is entered in the upper right-hand corner if the man is classified "ill," and no mark if he is classified "not ill."*

*17. The surgeon then has each "ill" man's name on the food sheet underlined in red, and a red mark drawn through each "X" mark that indicates an eaten food in the food-item list opposite his name. The hour that each man became ill is entered above his name on the food sheet.*

*18. The surgeon then makes preliminary inspection of the food sheets to learn, if possible, which items and meals should be considered as most likely to have caused the outbreak.*

*19. The surgeon again contacts the mess.*

Having drawn up a list of suspected food items on the basis of his preliminary inspection of the food sheets, he sends his sanitary inspector with this list to the mess to learn which, if any, of such items are among the leftover foods which the surgeon requested be saved; to bring back samples of any found; and to release for proper disposition any leftovers not under suspicion.

20. *The surgeon initiates necessary laboratory work.*

He causes the inoculation into the proper media of specimens of the following: available leftover suspected foods; stools from selected typical cases; and stools and swabbings from the throats and suspicious skin lesions of suspected food handlers. He has the plates and tubes properly labeled, and directs these, as well as gross specimens of any suspected leftover foods, to be properly packaged, labeled, and transported without undue delay to the hospital laboratory.

21. *The surgeon then conducts as thorough a study, including statistical analysis of available data, as is required to identify conclusively the meal and the food item causing the outbreak.*

He inspects the food sheets in order to exonerate nonoffending meals and to incriminate the offending meal and food in accordance with the following criterion: A food or meal can be considered responsible for the outbreak if everyone classified as "ill" reported having eaten it, while a substantial proportion of the group classified "not ill" reported having not eaten it.

At times a simple inspection of the food sheets will serve to exonerate certain *meals*, in that it shows that a substantial proportion of the men who became ill reported not having eaten these meals. By similar evidence, certain *foods* are exonerated. However, there is often one meal, and occasionally even one food in that meal, which fulfills—and stands out alone as fulfilling—the stated criterion. If this is the case, the surgeon is justified in considering that meal or food item to be the cause of the outbreak. More frequently no particular meal or food that completely fulfills this criterion can be found through simple inspection of the food sheet entries. Often exceptions will be found that on the surface invalidate the "perfect" evidence against a particular meal or food. For example, some persons classified as "ill" may report *not* having eaten it. Sometimes by interrogation and investigation it can be shown that some or all of these persons appearing to be exceptions actually had coincidental cases of diarrhea, not cases belonging to the outbreak. Faulty memory, or deception, or incorrect asking of the question may have caused a person to state that he did not eat the suspected food when in reality he did eat it. As previously explained, however, definite precautions must be taken in making these excuses lest bias be introduced into the study.

In the criterion as stated, it is postulated that a "substantial" proportion of the group classified "not ill" did *not* eat the food item. Obviously, if everybody ate a particular item of food there would be no basis for comparison between ill and well men with respect to eating this item, and it would therefore be impossible to adduce statistical evidence sufficient to incriminate this item.

Up to this point, no statistical treatment of data has been required except counting "ill" and "well" persons, and persons eating and persons not eating each of the meals and each of the several items of food. If, however, no one meal or food item is found to satisfy the criterion, the surgeon must test the soundness of his opinions and conclusions—that is, subject to statistical scrutiny and testing the data on which such opinions and conclusions were based.<sup>2</sup> There is a very simple test, namely, the chi-square test,<sup>3,4</sup> which is suitable for use in connection with the epidemiologic investigation of the type of outbreak under discussion.

#### EXAMPLE OF USE OF CHI-SQUARE TEST IN CONNECTION WITH THE EPIDEMIOLOGIC STUDY OF A DIARRHEA OUTBREAK

Number of men interviewed 300  
Of whom there were classified "ill" 200 (2/3 of 300)  
Of these same 300, the number eating pudding was 270 (9/10 of 300)

*If eating pudding had nothing to do with causing illness*

"Expected" findings would be that:

Of the "ill" men, numbering 200  
9/10 ate pudding, or 180  
1/10 did not eat pudding, or 20

"Expected" proportion  $\frac{\text{Eaters } 180}{\text{Total } 200}$

Of the pudding eaters, numbering 270  
2/3 became "ill," or 180  
1/3 remained "well," or 90

"Expected" proportion  $\frac{\text{'Ill } 180}{\text{Total } 270}$

*However*

"Observed" findings were that:

195 of the 200 "ill" men ate pudding  
5 of the 200 "ill" men did not

$\frac{195 \text{ Eaters}}{200 \text{ Total}}$  "Observed" proportion

Of the 270 pudding eaters:

195 became "ill"  
75 remained "well"

$\frac{195 \text{ Ill}}{270 \text{ Total}}$  "Observed" proportion

The differences between corresponding "expected" and "observed" proportions in the above illustration are of such magnitude as to raise a question as to the validity of the hypothesis that eating pudding had nothing to do with causing illness. The chi-square test would be useful in testing this suspicion, through determining the statistical significance of these differences. This test yields a value for chi-square for which there can be found in statistical textbooks<sup>5,6</sup> the value for the corresponding "P" (tables 1 and 2). "P" means "probability" and is a measure of the likelihood that chance alone accounts for the differences seen between corresponding "expected" and "observed" proportions. The smaller the "P," the less this likelihood. In the example above, the chi-square (with Yates' correction) is 35.04, for which the corresponding "P" is *less than* 0.005. This is well within the range of "P" (0.05 and less), to which statistical significance is ordinarily attributed. However, a "P" within the range of statistical significance does not mean that chance did *not*

account for the difference from which the "P" was derived. It only means that a cause-and-effect relationship should be postulated between the events in question (*e. g.*, eating pudding and becoming ill) unless and until shown to be untenable on the basis of good and sufficient evidence.

TABLE 1. "Four fold table" using the statistics from the example of use of chi-square ( $\chi^2$ ).

Ate		Did not eat	Total
Ill	a 195 (180)	c 5 (20)	a+c 200
Not ill	b 75 (90)	d 25 (10)	b+d 100
Total	a+b 270	c+d 30	a+b+c+d 300

Numbers in parentheses are "expected" findings.

2. Formula for computing  $\chi^2$ :

$$\chi^2 = \frac{(ad-bc)^2 (a+b+c+d)}{(a+b)(c+d)(a+c)(b+d)}$$

3. Where there are small numbers, use the following formula (with Yates' correction):

$$\chi^2 = \frac{(|ad-bc| - \frac{1}{2}(a+b+c+d))^2 (a+b+c+d)}{(a+b)(c+d)(a+c)(b+d)}$$

(The symbol  $||$  means the absolute value.)

TABLE 2. Table of conversion of  $\chi^2$

$\chi^2$	P	$\chi^2$	P
.000157	.99	1.074	.30
.000628	.98	1.642	.20
.00393	.95	2.706	.10
.0158	.90	3.841	.05
.0642	.80	5.412	.02
.148	.70	6.635	.01
.455	.50	7.85	.005

If for several foods "P's" are found by the chi-square test which are within or near the range of statistical significance, *i. e.*, 0.05 or less, consideration must be given to the possibility

that the causative agent might be a "common denominator" ingredient, *e. g.*, milk, common to several or all of the foods for which such "P's" were found. If, for example, the "P" found for coffee cream in a particular outbreak is less than 0.05, then the "P's" for other suspected items of food should be computed. Such values of "P" would be well within the range of values explainable by chance alone, most likely between 0.20 and 0.80, *unless* the same cream, or the milk from which it was taken, was served as a part of other foods or in other forms than as coffee cream. This happened in one outbreak studied by the authors, and a chi-square test was run on the basis of the observed difference between two proportions, namely, the proportion of the ill group constituted by consumers of milk or cream in any form, and the proportion of the well group constituted by consumers of milk or cream in any form. This chi-square test gave a "P" definitely within the range of statistical significance and showed that the "common denominator" was milk or cream in whatever form it was served. For the *non-milk-or-cream-containing* assortment of foods a "P" of 0.23, or 1 in 4, was obtained, which is well within the range explainable by chance alone. Thus, through actual computation the authors refuted the anticipated argument that for any other assortment of foods there might have been obtained as good a "P" as was obtained for the milk-or-cream-containing foods as a group.

If, however, the "P's" for several items of food are found to be within or near the range of statistical significance and yet no "common denominator" food ingredient is incriminated, consideration must be given to the possibility that as the result of improper sterilization the utensils in which these foods were prepared or served may have contaminated these foods with the causative organism.

The surgeon is not expected to be a statistician. He has merely to make a table like the one illustrated in table 1; enter in it the values for a, b, c, and d; and turn the table with these values and the chi-square formula over to any one who knows what the simple algebraic expressions mean and who can add, subtract, multiply, and divide. This person could then derive the value of chi-square, for which the surgeon could then find the corresponding "P" in the table in table 1 or in a textbook of statistics.<sup>3,4</sup> The use of a calculating machine, although not indispensable, would materially facilitate the mathematical computations and ensure greater accuracy. If the surgeon finds that more "formidable" statistical procedures are required, he should consult a statistician. There is probably one in the office of the surgeon of the next higher headquarters.

If the surgeon finds one meal only, and/or one food item only, for which the chi-square test gives a "P" of 0.05 or less, he

can, with reasonable assurance, incriminate this meal and/or food as the source of the outbreak. The same is true for any "common denominator" food ingredient.

If for no food or beverage item a "P" within or near the range of statistical significance is found, the surgeon checks the chi-square formula on each of the meals for the 24-hour period preceding the "period of greatest probability."

If for any one of the meals served during the 24-hour period preceding the "period of greatest probability" the chi-square test yields a "P" within the range of statistical significance, that meal can be incriminated. In this event it might be well to recall a sufficiently large "sample" of ill and well members of Baker Company to ask them which of the individual food items they ate at that meal. The master menu for that meal should be studied and such information should be elicited for that meal as was elicited through the mess inspection in step 6 for the meals served during the "period of greatest probability." In the absence of detailed food sheet entries for the incriminated meal, the story concerning the preparation and handling of food served at this meal may yield presumptive evidence against one particular item of food.

*22. If studies to this point have turned up anything which should form the basis of "stop-gap" instructions to Baker Company, the surgeon issues such instructions to the company commander or his designated representative.*

*23. The surgeon then writes to the appropriate commander a special sanitary report of this outbreak with recommendations for corrective action and prevention of future outbreaks.*

He should use language easily understood by a layman.

He should state such of the following as is applicable and determinable: Time of the outbreak; its magnitude in terms of percentage classified as "ill" out of the group interviewed; the fact that only the one company was affected, and that this company operates its own mess and that no other unit messes with it; the clinical picture of the typical case and roughly the proportion of mild, moderately severe, and severe cases; the meal and food item incriminated as the cause, with a brief account of supporting epidemiologic and laboratory findings; and any positive findings made on inspection of the mess, study of the master menus, interrogation and examination of food handlers, et cetera, which might indicate faulty mess sanitation or food handling practices.

*24. The surgeon includes a copy of this special sanitary report and refers to it in his next monthly sanitary report.*

## SUMMARY AND CONCLUSIONS

The system of epidemiologic investigation described herein has been found, on trial, to be effective in identifying the offending item of food and discovering and pointing the way to the correction of the sanitary deficiency at fault in outbreaks of common diarrhea in military units. This system is characterized by the use of untrained personnel for the collection of statistical data and by statistical analyses so simple that they can be carried out successfully by medical officers who have little or no experience in epidemiology. Only a few hours' time is required for interviewing an entire company, and because the men are brought to the interview in increments no man need be kept from his duties more than an hour. It is possible to so organize and process the groups as to occasion little loss of company training or duty time.

It is believed that this system, with some modifications, would prove useful also in investigating diarrhea outbreaks attributable to a common mess in other "captive" groups, such as inmates of a prison or eleemosynary institution, or groups who could be readily reassembled for interviewing, such as patrons of a banquet or church supper and, under certain circumstances, the customers of a restaurant. It is further believed that this system could be adapted for use in the investigation of outbreaks, among such groups, of food-borne diseases other than common diarrhea.

This article does not attempt to offer a course in epidemiology, supplant the epidemiologist or the preventive medicine company, or advocate that the system of epidemiologic investigation described be employed indiscriminately. Rather it is intended to advocate the application of this system in any food-borne disease outbreak in which circumstances will permit or warrant its use.

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# THE VIABILITY OF TRANSPLANTED EPIPHYSEAL CARTILAGE

WILLIAM F. MacDONALD, *Major, MC, USA*

ROBERT J. BARNETT, *Lieutenant Colonel, MC, USA*

ERNEST A. BRAY, *Colonel, MC, USA*

**I**N SPITE of voluminous clinical and experimental research in the past century considerable doubt remains concerning the viability of transplanted bone.<sup>1-6</sup> There is also uncertainty as to whether or not growing epiphyseal cartilage will survive the procedure of transplantation from one area to another or from one person to another. It is generally conceded that the cells of preserved and transplanted bone die, but differences of opinion exist concerning the value of such transplants. These questions affect our clinical thinking in regard to the type of bone grafting that is most effective and the practicality of using transplanted epiphyseal plates or complete epiphyses to compensate for delay or cessation of bone growth of an extremity. In an attempt to shed further light on these processes, a number of experiments in epiphyseal cartilage transplantations were conducted in growing dogs.

## MATERIAL

The purpose of this study was to repeat the experiments of earlier workers with the addition of certain refinements not available to them. All our animals were placed on penicillin and streptomycin therapy postoperatively and the factor of wound infection was eliminated. Furthermore, the transplanted epiphyseal cartilage was firmly fixed in its new position by an intramedullary wire, thus avoiding any local motion which might have an effect on cellular viability and subsequent growth.

Twenty puppies of an average age of 8 weeks were used in these studies. There were 4 general types of experiments:

1. Removal and immediate reimplantation of an epiphyseal plate.
2. Immediate autogenous transplantation of another epiphyseal plate.
3. Immediate fresh homogenous transplantation.



#### 4. Transplantation of refrigerated and preserved epiphyseal plates.

The lower epiphysis of the radius was used in all animals, and in each case the epiphyseal plate was retained in position by an intramedullary wire. The opposite epiphyseal plate of the radius was left intact and was used for control measurements. On the operated side a needle was broken off in the metaphysis as a marker for subsequent measurement of epiphyseal growth. Preliminary studies were made on puppies to determine how much tissue required removal to eliminate the possibility of growing cells remaining and proliferating at the operative site. When this had been determined, an attempt was made in the subsequent experiments to remove all epiphyseal cartilage with as little adjacent epiphyseal and metaphyseal bone as was technically feasible. Dorsal incisions were made for exposure and only as much periosteal stripping was done as was necessary to carry out the procedure. After the operation the animals were all weight bearing without external fixation. There were no infections, but one animal died during the postoperative period. Roentgenographic studies were performed at 4-week intervals to note the appearance and state of closure of the transplanted epiphyseal plates as well as to measure the distance between the epiphyseal plates and the markers. In addition, comparison in over-all length of the radius was made with the opposite side as the control, determining by the marker whether the growth was from the transplanted epiphysis or from the one at the opposite end of the bone.

### RESULTS

While the number of experimental animals was too small for any definite conclusions, the results were sufficiently consistent to warrant description. Table 1 represents a summary of the results during a postoperative period sufficiently long to be considered significant. It will be noted that where reimplantation of an epiphysis was immediately performed at its original site; the epiphysis continued to grow, although the growth was definitely retarded (figs. 1 and 2). Autogenous transplantation of epiphyseal plates resulted in no growth and early closure of epiphyseal lines. Fresh homogenous transplants and preserved frozen transplants, either autogenous or homogenous, produced no roentgenographic evidence whatsoever of cellular viability or continued cartilaginous bone growth.

### SUMMARY

No conclusions can be drawn from this brief experimental study of the effects of epiphyseal cartilage transplantation. It appears to confirm, however, the extensive investigations of Haas,<sup>1</sup> Bisgard<sup>2</sup> and many others who believe that bone and bone-

TABLE 1. *Postoperative growth results of transplanted epiphyseal cartilage in 19 puppies*

Type of epiphyseal transplant	Number of puppies	Results
Autogenous plate reimplantation	3	All showed growth but only 20 to 60 percent of that of controls
Autogenous reimplantation of entire epiphysis	1	Growth 0.7 cm. but accompanied by disintegration of epiphysis
Autogenous plate transfer from another epiphysis	3	No growth
Homogenous plate transplant	6	No growth
Homogenous transplant of entire epiphysis	2	No growth
Frozen transplants, autogenous or homogenous	4	No growth

Figure 1. *Roentgenogram taken after reimplantation of lower radial epiphyseal cartilage plate showing intramedullary type of fixation and metaphyseal marker for growth determination.*

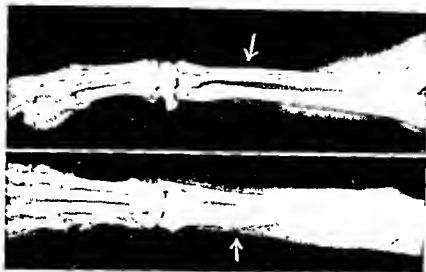


Figure 2. Roentgenogram of animal shown in figure 1, 7 months after operation, demonstrating by position of marker that growth has occurred at the reimplanted epiphyseal plate although it was only about 60 percent of the expected growth as compared with that of the opposite radius.

forming structures, when removed and replaced, do not continue their normal cellular activities and that direct reimplantation, fresh autogenous transfer, fresh homogenous transfer, and finally preserved grafts of any type show viability and growth in descending order. From these studies in growing dogs there is little encouragement for the proponents of epiphyseal plate transplantation for the purpose of improving growth potential following injury or disease.

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# SURGICAL TREATMENT OF PULMONARY TUBERCULOSIS

ELMORE M. ARONSTAM, *Lieutenant Colonel, MC, USA*

JOHN B. PLUM, *Lieutenant Colonel, MC, USA*

**S**INCE 1947 there has been a progressive increase in pulmonary resection in patients with tuberculosis at Army thoracic centers. At this hospital, about 15 per cent of the patients with pulmonary tuberculosis undergo pulmonary resection as part of their over-all treatment. It is the mission of the Army to conserve or rehabilitate as many persons as possible for full military duty. The investment in each enlisted man and officer for his training and experience is an appreciable one, amounting to many thousands of dollars. Return of the man to duty rather than retirement obviates a considerable loss. Treatment of the person with tuberculosis, to be practicable economically and logistically, however, must not require hospitalization from a 2- to 3-year period as has been done previously.

## PLAN OF TREATMENT

To this end, we have shortened the total hospitalization to a maximum of 14 or 16 months. Because clinical evidence indicates that present chemotherapeutic agents exert their maximum effect at about 8 to 10 months, we have aimed, in general, at a total period of chemotherapy of from 9 to 11 months. Adequate pulmonary resection is done somewhat early in the course of this chemotherapy (2 to 4 months) at a time when softer pneumonic components are no longer seen on the roentgenogram and after the bronchoscopic findings are normal. Following postoperative rest and drug therapy, a short period of hospital observation and leave ensues before the patient returns to duty. This plan of treatment has been applicable for the majority of our patients because most of them had only minimal or moderately advanced tuberculosis. From point of duration, they did not have old, long-standing, bilateral, advanced, fibrocavitary disease for which a longer and different approach to treatment must often be adopted.

## RATIONALE OF RESECTIONAL THERAPY

The rationale for pulmonary resection in tuberculosis is based on pathologic, bacteriologic, and empiric evidence at hand today. Seven years' experience with chemotherapy has given us important

pathologic data. Antituberculosis drugs have been found unequivocally to resolve a pneumonic or lobular area of inflammation produced by tuberculous infection in a short time of 6 to 8 months. The behavior of the necrotic caseous component of the disease, however, is entirely unpredictable. Medlar<sup>1</sup> has observed, as have we, that liquefaction and sloughing can occur during, and even after, prolonged chemotherapy. Roentgenograms and microscopic observation of pulmonary lesions often give dissimilar impressions as to activity in the individual lesion. The similarity of resected necrotic caseous lesions from persons having had and from those not having had chemotherapy is striking. The unpredictability of the progress of these necrotic lesions is probably directly related to the recurrences or relapse of disease observed in patients treated with chemotherapy. Cavitory disease of tuberculosis pathologically has more ominous implications. True healing of cavities is rarely observed microscopically. In the past it has been difficult to culture *Mycobacterium tuberculosis* from necrotic caseous residual lesions removed from patients whether or not they received chemotherapy. Recently, Hobby and associates<sup>2</sup> by improved culture methods were able to grow *Myco. tuberculosis* in an extremely high percentage of cases. This confirms the belief held for a long time that the *Myco. tuberculosis* invariably seen on resected specimens from preoperatively proved cases are viable even after long periods of chemotherapy. That they are pathogenic for the host is probably true in a majority of instances. Not infrequently have we seen relapses in patients receiving chemotherapy for up to a year. Thus, we are extremely reluctant for these reasons to return a man with necrotic or cavitory residuals in his lungs to military duty.

### METHOD OF STUDY

We have assembled pertinent data on all patients undergoing surgical intervention for proved tuberculosis. Tuberculous organisms were found preoperatively or in resected specimens from these patients. We are following them year after year to determine how they progress under our present plan of combined medical-surgical treatment. Each patient is sent yearly a detailed questionnaire about himself and his health. Those giving questionable answers concerning their health are invited back at Army expense for re-examination or, if this is impractical for the patient, the local physician or hospital is contacted for more information. Tables 1 through 3 indicate some of the pertinent results of the combined 1953 and 1954 cases.

### DISCUSSION

Patients in this group are relatively young and predominantly white males. Most patients (135) had moderately advanced pulmo-

nary tuberculosis according to National Tuberculosis Association standards. A sprinkling of minimal and far-advanced cases were included (56 minimal; 15 far-advanced).

TABLE 1.

Primary operations	Number	Secondary operations	Number
Segmental resection	106	Thoracoplasty	38
Lobectomy	41	Segmental resection and thoracoplasty	1
Wedge resection	7	Segmental resection	1
Pneumonectomy (extrapleural)	1	Drainage of empyema	3
Primary thoracoplasty	1	Lobectomy	1
Decortication	4	Thoracotomy to control bleeding	3
Lobectomy and thoracoplasty	14	Closure of bronchopleural fistula	2
Segmental resection and thoracoplasty	1	Thoracotomy for wound dehiscence	1
Segmental resection and wedge resection	10	Prenemphraxis	4
Segmental resection and lobectomy	10		
Segmental resection and decortication	1		
Segmental resection, lobectomy, and thoracoplasty	3		
Wedge resection and lobectomy	5		
Wedge resection, lobectomy, and thoracoplasty	1		
Segmental resection, wedge resection, and decortication	1		
Total	206	Total	54

For the most part these were parenchymal pulmonary problems, pleural problems having been infrequent (6 decortications in the 2 years). Most patients had resections to eliminate a necrotic or cavitory residual. The indications for operation have changed little in the past 2 years. A comparison of the types of operations performed shows a predominance of segmental resections. Experience here as well as elsewhere has shown that single or multiple segmental resections can adequately remove significant caseous or cavitory residuals. In a large number of patients (26 per cent), fine gross residual disease has been left in the form of scattered tiny nodules in the remainder of the lung and mediastinal lymph nodes because one cannot resect all of a patient's tuberculous lesions. We resected the larger caseous nodules, those beyond a few millimeters in diameter, as well as the cavitory residuals,

TABLE 2. *Operative and postoperative complications*

Complication	Number
Bronchopleural fistulae	8
Persistent air leak	8
Persistent space	9
Empyema	10
Wound infection	3
Atelectasis	11
Hemorrhage	8
Pleural effusion	2
Incarcerated scapula	1
Subscapular effusion	1
Wound dehiscence	1
Postoperative pneumothorax	1
Extrapleural hematoma	2
Thrombophlebitis	1
Patients with complications	45 (22%)
Patients with no complications	161 (78%)
Total cases	206 (100%)

TABLE 3. *Follow-up of patients*

Number of patients	206	Hospitalized	
Number followed	200	Persistent bronchopleural fistula	1
Well	195	Schizophrenia	1
Recurrence or spread	0	Reactivation of contralateral disease	1
		Deaths	
		Cerebral anoxia during operation	1
		Train wreck	1

conserving as much lung tissue as possible. We have elected to explore and resect the pulmonary lesions first rather than perform a first-stage thoracoplasty as an initial procedure. In 1953, a large number of secondary thoracoplasties were performed in the belief that *perhaps overdistention of the remaining lung* had a deleterious effect on pulmonary function and might lead to reactivation of disease. This has not been borne out clinically.

In 1954, secondary thoracoplasty was performed only for space problem, persistent leaks, or fistula. Generally, the first rib was stripped, an apicolysis done, and parts of the second, third, and fourth ribs were removed as needed, leaving the transverse processes. Since this became standard procedure in 1954, we have had no complications from this operation, and no deformity. No evidence as yet of disease reactivation or pulmonary function

loss has become apparent in patients not receiving a secondary thoracoplasty following segmental resection.

Multiple procedures have been performed frequently; however, we are convinced that the inclusion of a thoracoplasty simultaneously with resection increases the risk of complications appreciably, and it is to be avoided except in the most suitable good-risk case. Seventy-eight per cent of our cases were uncomplicated. A comparison of the complication rate of each year is interesting. In 1953, only 70 (75 per cent) of the 94 primary operations were uncomplicated. In that year, there was one death. Anesthetic difficulties produced cerebral anoxia and eventual death. In 1954, 91 (81 per cent) out of 112 primary operations were uncomplicated, and no deaths occurred. We believe this represents a considerable improvement in technic of anesthesia, surgical judgment, and active postoperative care. The decrease in complication rate occurred at a period when our staff was reduced from four to two men, indicating that a tight, closed staff of trained personnel can probably decrease its complication rate. Another factor to be considered is that in 1954, thoracoplasty was combined with resection in only four instances. In 1953, this combination occurred 14 times, resulting in a total of 11 complications occurring in 6 of the patients. In 1954, in the four combined operations, there were only 5 complications, all of which occurred in one patient.

Persistent air leaks lasting over 2 weeks, although few in number, occurred in patients having segmental resections and in one having a lobectomy. Space problems were observed after both lobectomy and segmental resection. Bronchopleural fistula was a minor problem, most frequently occurring following a lobectomy. After lobectomy, four out of five fistulas occurred in 1953, and two out of three in 1954. All leaks, fistulas, and space problems, with one exception, were successfully treated.

Atelectasis was considered a complication when it involved a lobe or more and required use of the bronchoscope. Vigorous postoperative care has largely prevented development of this condition.

Because of rapid turnover in laboratory personnel and due to limits imposed by workload and space, we were unable to get as many positive cultures and smears from resected specimens as we would have liked. It is striking, however, how many times cultures were positive when smears and stains were negative. Cultures from 8 resected lesions in 1953, and from 9 in 1954, were positive although stains and smears had been negative. We have arbitrarily grouped the patients into those with only active lesions (pneumonic processes—4 cases), those with moderately active lesions (mixed lesions—200 cases), and those with apparently burned-out



or fibrosed lesions (inactive—1 case). Our patients had predominantly moderately active lesions.

Postoperative chemotherapy has varied with the problem at hand. We aim at giving a total of from 10 to 11 months of drug therapy pre- and post-operatively, prolooging therapy slightly in patients with far-advanced or relatively active disease, particularly when persisting after several months of preoperative therapy.

In 1953, functional results were unsatisfactory in three patients. One was discharged with a persistent bronchopleural fistula. Two patients had somewhat unsatisfactory ehoulder motion due to the effects of thorecoplasty. Of the latter, one ie on active duty in the Army, end ooe is practicing law full time. In 1954, no patient had poor functional results.

We have heeo able to follow 200 patients—88 of the 94 operated on in 1953 and 112 of the 1954 patients. In 195 patients, we have found oo evidence of recurrence or reactivation, and we believe that they are fit for military duty or gainful employment. Of the other five patients followed, ooe has a broochopleural fistula; ooe is hospitalized for schizophrenia (however, his tuberculosis ie arrested); one is being treated for reactivation of disease in the cootralateral luog; ooe died io a train accident; and ooe petlent died es a result of cerehral anoxia during operatioo.

Our policy ie to returo patients to duty or temporarily retire them after completioo of treatment. Thus far, we have had no evidence of relapse in those patients doing military duty or gainful civilieo work.

### CONCLUSIONS

It seems from the follow-up data available that pulmonary resection is effective and that to date recurrence of tuberculosis has not been a problem. Further effort must be made to reduce operative and postoperative complications, particularly that of poor functional results.

That surgical therapy can be performed with acceptable, non-disabling morbidity has been demonstrated; however, we are convinced that resection can be safe and effective only in an optimum setup with the best of equipment and trained personnel in medicine, surgery, anesthesia, nursing, and physical medicine.

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# HYALURONIDASE INSTILLATION IN TREATMENT OF GANGLIA

## A Preliminary Report

JAMES B. ANDERSON, *Major, USAF (MC)*  
JOHN A. BOLLINGER, *Captain, USAF (MC)*

**F**INDING a simple method of treating a ganglion of tendon sheath or joint capsule has remained a perplexing problem of considerable interest to the military surgeon who, because of the high incidence of the lesion in people in the military age group, is more frequently confronted by it than is the civilian physician. A troublesome ganglion is found more often in those whose occupation requires optimal use of tendons and joints of the wrist. Selection of a method of therapy is complicated by the military surgeon's obligation to conserve manpower and his realization that adequate surgical excision will result in the loss of many man-hours for each patient. This preliminary report describes a simple method of treating this condition.

## ORIGIN OF GANGLIA

Bunnell<sup>1</sup> is of the opinion that a ganglion arises from a tendon sheath or joint capsule but does not communicate with the synovial cavity. Others believe that the ganglion arises as a herniation of the synovial membrane or the joint sheath space. In support of Bunnell's conclusions on pathogenesis, some authors have found that connective tissue undergoes proliferation and mucoid degeneration with the formation of numerous small cysts that eventually coalesce into a ganglion with little or no synovial lining.<sup>2,3</sup>

## METHODS OF TREATMENT

Forceful disruption of the ganglion by striking the lesion with a book not only has been ineffective, but seems to be a crude and hardly professional approach to treatment.

Surgical excision has been the treatment of choice. If one accepts the theory of origin of Carp and Stout,<sup>3</sup> adequate surgical excision requires not only removal of the ganglion, but also stripping of the adjacent sheath or capsule to preclude recurrence. Such surgical excision usually eradicates the ganglion,

but postoperative swelling and necessary immobilization prevent the patient from carrying out his work competently for a period of 2 to 3 weeks. Another complication of surgical treatment is keloid formation. Recurrence following surgical excision is reported as from 15 to 33 percent.<sup>4</sup>

Among the nonoperative methods of therapy, the injection of sclerosing agents into the ganglion has been uniformly unsuccessful.<sup>4</sup>

Injection of hydrocortisone acetate has been successfully employed by Becker<sup>5</sup> in eliminating or reducing 30 ganglia; 26 disappeared, while 4 became small and asymptomatic.

Hackel<sup>6</sup> recently published a preliminary report on the use of hyaluronidase injections for ganglia with considerable success. He postulates that the mucoid substance of the ganglion is of mesenchymal epithelial origin and that hyaluronic acid is responsible for its characteristic viscosity. Following admixture with hyaluronidase, a "break-down" or "degradation" occurs, resulting in a marked reduction of viscosity as measured by the Ostwald viscometer.<sup>6,7</sup>

On the basis of the preliminary reports just mentioned, and the stimulus of the large number of patients with ganglia seeking treatment at the Air Force Clinic of this hospital, an evaluation of hyaluronidase instillation was undertaken. Results of treatment of 81 consecutive patients with ganglia are reported.

### TECHNIC

One half to one milliliter of 1 percent procaine was mixed with 500 turbidity reducing units of hyaluronidase and instilled into the cyst through a 19-gauge needle whose bevel had been shortened to facilitate injection of all the hyaluronidase into the cyst rather than part of it into adjacent tissue. Insertion of the special needle was preceded by a small intradermal wheal of procaine hydrochloride. Aspiration of pathognomonic xanthochromic viscid mucoid material was carried out to confirm (1) the clinical impression of ganglion and (2) the location of the tip of the needle in the cyst cavity. (One tumor was eliminated from this series by this technic, because whitish material was aspirated; subsequent microscopic examination of the surgically excised tumor afforded a diagnosis of "rheumatoid nodule." Without aspiration, this case would have been a statistical failure due to faulty diagnosis.)

Thirty-nine patients were males and 42 were females. Eight patients (9.9 percent) had recurrent ganglia following previous surgical excision. Occupation of each patient and presenting site of the ganglia are listed in tables 1 and 2. Of the 81 patients, 46 were between 21 and 30 years of age, and 21 were between 31 and 40.

TABLE 1. *Occupations of the 81 patients*

Occupation	Number
Office (typing, clerical, or filing)	28
Housewife or waitress	25
Mechanic or carpenter	14
Student	4
Musician	3
Nurse	3
Manual labor or athletics	2
Telephone operator	2
Total	81

TABLE 2. *Presenting site of ganglia in 81 patients.*

Extremity	Location	Number	Total
Upper	Wrist		
	Dorsal	47	
	Volar	15	
	Hand		
	Dorsal	9	
	"Snuffbox"	2	
Lower	Finger		
	Volar	4	
	Knee, lateral	1	
	Ankle, dorsal	1	
Total	Foot, dorsal	2	
			77
			4
Total			81

Single injections sufficed in 68 patients. Two injections in eight, three injections in two, and four injections in three patients were carried out. Multiloculation or faulty technic may have necessitated more than one injection. Immediately after instillation of hyaluronidase, the swelling softened and the contents could be easily aspirated or expressed by pressure. Following the injection each patient was returned to normal activity with only elastic bandage compression of the site until the following morning. On re-examination in 24 hours, the swelling was usually absent. If, however, residual swelling persisted, further injections were carried out at intervals of several days.

### RESULTS

Of the 81 patients, 67 (82.7 percent) responded completely. Six of the 14 in whom treatment failed had much smaller tumors which

did not feel cystic after treatment. Five patients stated that the residual swelling had become asymptomatic. A summary of the length of the follow-up period and the recurrence rate is given in table 3. In two patients, residual thickening was explored and surgically excised. A cystic ganglion was not grossly discernible in either of these specimens. Microscopic examination disclosed "thickened fibrocollagenous tissue" in one and "an obliterated cyst retaining an epithelial lining" in the other. These findings suggest that after hyaluronidase dispersion of cyst fluid, the walls collapse, become adherent, and are replaced or coapted by fibrous tissue. Such obliteration is proportional to the extent of disruption and evacuation of the ganglion. Complications were encountered, but these were inconsequential, requiring symptomatic treatment and apparently not materially detracting from the gratifying result. One patient developed a small hematoma which resorbed spontaneously, and 3 developed a nonspecific tenosynovitis, 2 of whom required plaster immobilization, responding to treatment within 2 weeks or less.

TABLE 3. *Follow-up and results of hyaluronidase instillation into ganglia in 81 patients*

Follow-up interval (months)	Number of cases	Number of recurrences
Over 12	9	2
6-12	26	5
3- 6	27	7
1.5-3	19	0
Total	81	14*

\*Of the 14 refractory ganglia 13 were obviously refractory during the first three months of observation, and one within six months.

Those ganglia that ultimately recurred gave evidence in the first few months that they would be refractory, 13 of 14 recurring within 3 months. In the 8 patients whose ganglia had been surgically treated elsewhere, recurrence after surgical excision was noted within 3 months. If resolution is not obtained within 2 or 3 months, surgical excision can be carried out without further delay.

Although treatment by hyaluronidase instillation resulted in some failures, results in 81 patients appeared to be as effective (83 percent) as excision (67 to 85 percent). It did afford, however, a method for those who declined surgical treatment or for those who could ill afford loss of working time.



## SERVICE ARTICLES

### THE SECRET OF SUCCESS

WARNER F. BOWERS, *Colonel, MC, USA*

**D**ISRAELI once said, "The secret of success is constancy of purpose." Unfortunately, owing to the individual variations among us, these eight simple words carry different implications and connotations depending on our backgrounds and past experiences. Consequently, it is necessary for us to define what we mean by success, what comes to mind when we speak of constancy, and what we accept as our purpose. It has been said that intelligent men always agree once they know what they are talking about, and I'm sure you will admit that most of our arguments and discussions are made necessary because we have failed accurately to define our terms of reference. The art of communication is a difficult one because of semantic variations and nuances of connotation.

Let us first discuss what we mean by success, and I suspect that were we to poll this audience, or almost any group of Americans, the preponderance of definitions would hinge on bank account or other evidence of material wealth. The "have" nations as compared to the "have nots," tend to place high valuation on what can be measured, weighed, or held in the hand, and while this is not necessarily bad, there is a tendency to neglect the more intangible factors which go to make up success. Certainly all of us can point to persons who have had great material success and yet are extremely poverty stricken in their interpersonal relationships.

There is in all of us an impediment to perfect happiness: namely, weariness of the things which we possess and a desire for the things which we have not. Possibly success and happiness are not exogenous and based entirely on material possessions but they may be endogenous, arising from within as a result of such elements as maturity of reaction, equanimity, constancy of goal, and well-rounded self-development. Can we not agree that success has two general components: the exogenous, depending on the acquisition of enough material goods so that we and our families can have all of the necessities and some of the luxuries, and the endogenous, depending on sufficient personal self-development so that we can act and react in as

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From Brooke Army Hospital, Fort Sam Houston, Tex.

nearly an adult, mature manner as possible? The dictionary defines success as the degree of attaining one's desired end, and consequently we may have to leave "success" at this point until we consider "purpose."

First, however, let us examine our concept of "constancy." The word itself means steadfastness, firmness of mind, and freedom from change, that carries the unfortunate overtone of rigidity and immobility. It is all very well to stand steadfast as a rock, but you may get covered by moss. I like to think of constancy as dynamic rather than static, as changing with circumstances and situations, but always aimed in the predetermined direction. Our concept of constancy will depend somewhat on the type of goal or purpose that we select. If our goal is easily attained and too limited in scope, we find ourselves constantly in the necessity of setting up new goals as the old ones are reached. We should think, therefore, of a high purpose or ultimate goal toward which there are many lesser goals or steppingstones, but all tending toward the final end result.

Unless we have a correlated and integrated plan, we progress from crisis to crisis by erratic rushes, we explore too many blind alleys and waste too much time retrieving lost ground. Too few of us take time to consider such matters. All of us should spend a few moments each day in orienting ourselves with our goal, in thinking noble thoughts, and in taking stock of ourselves. This is not sentimentality but very hardheaded practicality.

One of the most difficult things in life is acquiring the ability to get along with our fellow men, and too often the phrase "getting along with people" carries the connotation of spineless appeasement, blind agreement, and fear of antagonizing anyone. Such vacillation is completely unacceptable and incompatible with a well-conceived goal. First, it must be realized that it is impossible to agree with everyone, please everyone, and make everyone like you. It is not even desirable.

We must carefully set our own goal, aim our actions toward it, and let the chips fall where they will so that we can live at peace with our own consciences. This is called integrity and is a highly desirable trait to be cultivated. In this vein, William Ellery Channing has said, "Whatever you may suffer, speak the truth. Be worthy of the entire confidence of your associates. Consider what is right as what must be done. It is not necessary to keep your property, or even your life, but it is necessary to hold fast to your integrity." In this day of "brainwashing" and "turncoats" it is essential that we emphasize integrity of character. How different would be the future of many young officers and soldiers had they appreciated this principle.



Too great rigidity and inflexibility is just as bad as too great tolerance. Plato said, "For every good there are two evils; the extremities in either direction." This, of course, is a paraphrase of the Socratic doctrine of the golden mean. Even tolerance is bad in its extreme form. An example of too great tolerance is the Buddhist philosophy that all is truth or some facet of truth. By this concept, untruth is but the backside of truth and therefore simply a phase of truth. Dishonesty is simply the other side of honesty, and therefore what may seem as cheating and dishonesty to us may simply represent a variant of honesty to others.

Intolerance, on the other hand, may keep you in continual turmoil. For example, certain recent events and happenings may not be entirely to your liking and you may find yourself in a situation of which you do not entirely approve. Vain struggle against circumstances may needlessly batter you without contributing to your goal. Epictetus said, "Ask not that events should happen as you will, but let your will be that events should happen as they do, and you will have peace." This statement requires some careful thought and simply suggests that we rock with the punches and don't fight the problem. Eleanor Roosevelt has turned a neat phrase in this regard. She said, "It is not that I have so much energy, but just that I never waste any of it in indecision or regret." In other words, know where you want to go and be on your way. An interesting variation of the idea of a goal is expressed in the philosophy of Chang Kuo Lao, one of the eight Chinese immortals. He is always depicted as riding his mule facing backwards, because he felt that it makes no difference where you are going since all that really counts is how you react along the way.

Pain is the appetizer which makes pleasure more palatable. The snow-capped mountain may seem a jagged crag from the north, while it looks like a soft snowball from the south. Yet it is the same mountain; only the viewpoint has changed. The various vicissitudes of life are tools with which one's character is shaped, and mortals are placed on earth to develop character, so that whether a man has good fortune or bad is relatively unimportant. It is only his reaction to that fortune which counts. The man who suffers adversity and reacts in a proper way has developed his character in such a fashion that he has achieved a net asset, so that in the end he has been as fully benefited as though he had good fortune. Wealth and poverty are but two forces by which character is shaped, and not success and failure in themselves. Therefore, co-operate with destiny to strengthen character by whatever experience life has to offer, turning each event to good account in your favor. When we speak of turning events to your own ends and getting as much out of circumstances as you can, this may at first glance seem selfish, but such is

not the case. No man can be called selfish who advances his neighbors at the same time that he elevates himself.

This brings up the concept of loyalty. Your first and most important loyalty is to yourself and the things for which you stand. Naturally, then, you feel loyalty toward others who are honestly striving to do the best they can with the attributes they have been furnished. More generally, you owe loyalty to your government as long as it shows integrity and progress toward an acceptable goal. If these are not present, your loyalty as a citizen makes it mandatory that you play your small but important role in a corrective way at the polls. In other words, you have a proper niche to fill and it is your responsibility to fill it to the best of your ability so that you and your neighbor may profit thereby. In a more special way, those of you who are physicians owe a great duty toward and loyalty for your patients. Your patients have a right to expect that you will show complete honesty, integrity, faithfulness, truthfulness, and skill in all your dealings. Please note that I mentioned skill last, because too often we substitute mechanical and technical skill for medical wisdom. Many of us have knowledge, but what we need most is the wisdom to use that knowledge. Knowledge is static, whereas wisdom activates knowledge to make it dynamic and useful.

From what has been said, I hope you will have arrived at the conclusion that a suitable goal is the highest possible development of all the faculties and capabilities with which you have been endowed, and I hope you will agree that this is not a selfish goal, because it implies that you will assist others in their quest for development. More simply stated, this means that we should strive by all means at our command to become mentally mature, emotionally stable, well-integrated adults. Kung Fu Tse, whom we know as Confucius, has stated that a gentleman has nine aims: to see clearly, to understand what he hears, to be warm in manner, dignified in bearing, faithful in speech, painstaking at work, to ask when in doubt, in anger to think of difficulties, in sight of gain to remember right. A more modern and scientifically stated definition of maturity is that of Doctor Edward Strecker, who said that the really mature person possesses: ability to stick to a job; reliability, giving more than is demanded; persistence against obstacles; power of decision; determination to succeed and will to live; co-operativeness with others; and adaptability to time, place, and other people.

You are about to enter on a period in your life which may not have been entirely of your own choice and toward which you may not have completely unmixed feelings. We urge you to approach this with as mature and adult an attitude as you can, attempting to turn the situation to your advantage from the stand-

point of personal development. The attitudes and mannerisms which you are developing now will mold your future success, and we urge you not to sell yourself short. All of your patients should be treated just as if they were your most important private patients, and any duty you are asked to undertake should be completed according to your very best ability. Abraham Lincoln said, "I like to see a man proud of the place in which he works; I like to see a man work so that the place is proud of him."

We wish you well in your coming assignments and hope that you will be as proud of us as we are to have you with us.

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Some hospitals provide the doctor with a comfortable chair, while the patient is given a cheap, inferior, uncomfortable stool. This has a significance beyond the provision of comfort for the physician. It implies his superiority and the patient's inferiority. Sometimes this may be therapeutically advantageous, because it gives the doctor prestige, but sometimes it is a disadvantage. Prestige and rapport aid suggestion, and make it easier for the patient to accept the doctor's advice; but rapport is not dependent on prestige. Indeed the doctor's prestige may hinder the formation of rapport, if the patient associates prestige with the idea of inaccessibility.

—AINSLIE MEARES, M. B., B. AgrSc. Melb., D. P. M.  
in *Lancet*, p. 393, Sept. 18, 1954

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The great strength of the physician rests not in his degree, his training, his license to practice, nor his experience—his strength is the man that he is. That is the most important question to be asked concerning a professional colleague—is it his school, his hospital background, his associates, or even his honors? It is none of these, the great question is "What kind of a man is he?" The other things are important, yes, some even necessary, but the rest of the man is the man.

—THOMAS H. ALPHIN, M. D.  
in *Missouri Medicine*  
p. 1011, Dec. 1954

# REPORTING INFLUENZA AND ACUTE RESPIRATORY INFECTIONS

1942-1943

**A**LTHOUGH influenza viruses are easily and directly transmitted to a laboratory personnel who handles, stores, or examines clinical specimens, it is very easy to test for the etiologic disease and the collection of appropriate specimens for virus isolation and identification are easily accomplished in the course of the study of respiratory infections. Such studies should not be restricted to the study of clinical, preventive medicine, and laboratory problems. Data from the investigation of the general method of reporting for influenza and the collection and shipping of specimens have been included in the general instructions.

## INSTRUCTIONS

The instructions suggest that for it to be possible to be obtained from the collection of the early acute phase of the illness for virus isolation, the specimens of suspected influenza should be collected from about 10 patients in the acute phase of the illness, including those patients from whom the atypical cases are collected. About four patients in the acute phase should be taken as early after the onset of illness as possible and again four to 10 days later. Specimens for these studies should not be taken from patients who have received influenza vaccinations during the preceding 10-day period.

## OTHER LABORATORY TECHNIQUES

The importance of determining the presence of B-type virus infections<sup>1</sup> was also stressed in the cited instructions. In any outbreak, the paired sera should be first tested for influenza, and if negative, the sera from about six patients should be retested for increase in B1 antibodies. Because B1 antibodies may not achieve maximum levels until about 11 days after the onset of illness, it is well to include in addition to the 5- to 10-day blood sample, one taken from 11 to 21 days after the onset of the illness.

<sup>1</sup>From Office of the Chief Pathology and Microbiology Consultants, Office of The Surgeon General, Department of the Army, Washington, D. C.

## RESPIRATORY INFECTIONS OF UNKNOWN ETIOLOGY

The Department of Virus and Rickettsial Diseases, Walter Reed Army Institute of Research, Washington, D. C., is actively engaged in continuing studies to isolate viruses from patients with respiratory diseases whose etiology is unknown. Any outbreak of respiratory disease in which the cause seems to be neither influenza nor RI-group infection should be reported promptly to the respective Surgeon General so that study can be made. Of special interest are patients with primary atypical pneumonia in whom cold agglutinin or streptococcus MG agglutinin tests become positive.

All six Army area medical laboratories; the 406th Medical General Laboratory, Tokyo, Japan; the USAREUR Medical Laboratory, Landstuhl Medical Center, Germany; the Tropical Medical Research Laboratory, Puerto Rico; the Army Medical Research Laboratory, Kuala Lumpur, Malaya; and the Hawaiian Medical Laboratory are prepared to carry out tests for influenza and RI-type virus and assist in these studies.

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## THE EDUCATED PHYSICIAN

A doctor must be well educated, and that does not mean merely stuffed with knowledge, but capable of understanding in the sense that Lord Morley meant when he said the mark of an educated man was the ability to know when a proposition is proved or, what is often more important, when it is not proved.

—W. MELVILLE ARNOTT

in *Proceedings of the First World Conference  
on Medical Education*  
Oxford University Press, 1954. p. 278

# A MODIFIED SCREENING QUESTIONNAIRE FOR SERVICEWOMEN

JOSEPH FRIEDMAN, *Lieutenant (junior grade) (MSC) USNR*

**P**SYCHIATRIC screening of women for service is a relatively new area in military psychiatry and possesses some unique features. For the most part, the psychologic questionnaire and tools used as adjuncts have been borrowed from the screening of men. This article describes the need for modification of these methods and one step that has been taken to achieve this end.

The psychiatric unit at this recruit depot has as one of its functions the assessment of women recruits. This evaluation consists of interviewing all women recruits at least once and at periodic recall until a decision is made regarding their emotional suitability for service.<sup>1</sup> As aids in the initial screening several materials are used, including a questionnaire designed to elicit signs of maladjustment. It is with this tool the present article is concerned.

Although the scale had originally been designed for men, the past procedure had been to use the identical list of items for both male and female recruits. For some time the feeling had been growing that in the case of women much of this material was nondifferentiating; that is, that many of the items were of limited value in sorting women into two categories, psychiatrically "clear" and psychiatrically "suspect." I therefore undertook a twofold study: (a) to measure the effectiveness of the existing scale, and (b) to make improvements if it was found lacking.

## METHOD AND RESULTS WITH ORIGINAL QUESTIONNAIRE

The original questionnaires of all women who passed through the recruit depot during 1954 were examined. The responses of those who eventually became psychiatric casualties ( $N = 92$ ) were recorded. Of those who adjusted to service ( $N = 916$ ) every fifth record was selected ( $N = 183$ ) and their responses were also recorded. A statistical technic was then applied to investigate whether or not the two groups tended to answer the items in a significantly different manner. The statistic considered most appropriate was the  $t$ -ratio of proportions.<sup>2</sup>

Of the 70 items, 26 were found to be significant at the .05 level of probability and 13 at the .10 level. The remaining 31 items did not approach statistical significance. While these results provided a nucleus for a scale, it was believed that, as a whole, the tool was inadequate for its purpose and that modifications would be desirable.

#### METHOD AND RESULTS WITH MODIFIED QUESTIONNAIRE

New questions were then derived from the interviewing techniques of the examiners. Another valuable source of material was the autobiographic sketch that women marines prepare before further interviewing as they progress through a trial at duty. Still another source were the anonymous questions these recruits submitted in response to a lecture on psychosexual factors and their implications for group living.

A pretrial of these 60 items was administered to 62 recruits, and those items that were checked once or not at all were eliminated. The remaining 55 items were then submitted to a group of 201 recruits who adjusted successfully, of which every other case was used ( $N=100$ ), and to 39 psychiatric failures. Statistical analysis of the results of testing in this group of 139 subjects showed that 20 of the 55 items were significant—16 at the 0.05 level of confidence and 4 at the 0.10 level.

The 39 significant items from the original questionnaire and the 20 from the new one were then combined. Of these 59, 2 were dropped due to excessive overlap with the others. The modified scale when completed consisted of 42 items significant between the .001 and .05 levels and 15 at the .10 level (See Appendix).

Some attempt has been made to place the items into various categories, and a key has been added to aid the interviewer in noting along what lines the recruit's problems lie. Those categories are: (a) stress situations, (b) interpersonal relations, (c) reactions to enlistment, (d) relations to authority, (e) somatic concern, (f) withdrawal and/or projection mechanisms, (g) mood, (h) psychopathy, (i) tension and anxiety, (j) acceptance of feminine role, and (k) miscellaneous. The questions are framed so as to require both affirmative and negative answers, thus reducing the tendency to superficially mark the list.

Should this technic prove to be clinically satisfactory, it is conceivable that an extension of its scope would be warranted. It might be possible to establish a cut-off score on the number of problems claimed and to cross-validate this on another group of women. The check list would then be considered a test, and the scores might be used to predict service maladjustment. To assess their predictive powers, these results could then be compared with the results of interviews and trials at duty.

## SUMMARY

A statistical evaluation of the 70-item questionnaire was done to measure the discriminatory power of its items as applied to women. While many were significant statistically, the tool as a whole was believed to be inadequate for its purposes. Additional items were written and significance tests again run until a total of 42 items were accumulated which discriminated at least at the .05 level. An additional 15 items significant at the .10 level were also used, and a modified version of the questionnaire was evolved for servicewomen.

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## APPENDIX

Below are a series of questions and statements on several different topics. You are to answer "yes" or "no." "Yes" answers are represented by checking the box; "no" answers by leaving it blank. Be sure to answer as you really feel, not as you think others would answer. Your honesty is very important.

1. \_\_\_ Does rushing and being under pressure upset you?
2. \_\_\_ Are you often worried or upset?
3. \_\_\_ Do you feel that you will have trouble making good in service?
4. \_\_\_ Have you ever been fired or asked to resign from a job?
5. \_\_\_ Do you often feel tired, run down, and gloomy?
6. \_\_\_ Do you feel comfortable around new people?
7. \_\_\_ Insofar as you know, were you considered a 'very healthy child?
8. \_\_\_ Does being hollered at make you really upset?
9. \_\_\_ Does it seem to you that men get a better "deal" in life?
10. \_\_\_ Would you consider yourself a nervous person?
11. \_\_\_ Could you do more for your country in a civilian job than in the service?
12. \_\_\_ Do you sometimes get violently angry without good reason?
13. \_\_\_ Are you ever bothered with nervousness?
14. \_\_\_ Did your family move around enough to handicap you in making good friends?
15. \_\_\_ Do you have difficulty learning under stress?
16. \_\_\_ Did you dislike going to school as a kid?
17. \_\_\_ Do you often have trouble in getting to sleep?
18. \_\_\_ Life is best when we are children.
19. \_\_\_ Do you ever have pains in the heart or chest?
20. \_\_\_ As a kid did you feel you were often punished unfairly?
21. \_\_\_ Do you ever feel that you have more than your share of bad luck?



22. \_\_\_\_ Are you often ill at ease around your friends?
23. \_\_\_\_ Have you ever been in trouble for drinking?
24. \_\_\_\_ Did you ever look in a mirror and think you might be someone else?
25. \_\_\_\_ Do you feel that it was unfair for you to be called into service at this time?
26. \_\_\_\_ Were either of your parents often mean or unkind to you?
27. \_\_\_\_ Did you bite your fingernails often as a kid?
28. \_\_\_\_ All people are guilty of heavy sins.
29. \_\_\_\_ Usually do you prefer to be alone rather than with other people?
30. \_\_\_\_ Have you ever smoked reefers or taken dope?
31. \_\_\_\_ Do you have any particular physical or health problem?
32. \_\_\_\_ Does it make you uncomfortable when you haven't privacy in which to bathe and dress?
33. \_\_\_\_ Do you really like to fight?
34. \_\_\_\_ Have you had to make undue sacrifices by coming into the service?
35. \_\_\_\_ Do boys and men seem too fresh to you?
36. \_\_\_\_ Do people usually misunderstand you?
37. \_\_\_\_ Does most of life seem dull to you?
38. \_\_\_\_ Have you ever had dizzy spells or fainting spells?
39. \_\_\_\_ Do you resent others trying to advise you?
40. \_\_\_\_ Are you frequently bothered by back pains?
41. \_\_\_\_ Do you often feel that most of your troubles are not your fault?
42. \_\_\_\_ Do you have dates less often than most girls your own age?
43. \_\_\_\_ When you were punished, was it usually more severe than other kids got?
44. \_\_\_\_ In spite of what they say, people only look out for themselves.
45. \_\_\_\_ Do you feel that your life has been unsuccessful up to now?
46. \_\_\_\_ Do you consider your friends to be your equal?
47. \_\_\_\_ Are you ever troubled by a sick headache?
48. \_\_\_\_ Do you have trouble making friends?
49. \_\_\_\_ Will your time in the service keep you from achieving your personal goals?
50. \_\_\_\_ The worst thing about school was the bossy attitude of the teachers.
51. \_\_\_\_ Has anyone in your family ever had a nervous breakdown or been treated for their nerves?
52. \_\_\_\_ Do you think you were loved more by one parent than the other?
53. \_\_\_\_ Do people ever seem to purposely annoy you or pick on you?
54. \_\_\_\_ Do your hands ever tremble enough to bother you?
55. \_\_\_\_ Do you often get down in the dumps?
56. \_\_\_\_ Do you frequently drink just to get drunk?
57. \_\_\_\_ Have you ever held yourself back in some group to avoid being noticed?

# THE MANAGEMENT OF LARGE BOWEL INJURIES IN THE KOREAN CAMPAIGN

H. HASKELL ZIPERMAN, *Lieutenant Colonel, MC, USA*

**P**ERHAPS no greater advances in traumatic surgery have been made than those made during World War II for the treatment of penetrating abdominal trauma. In World War I the policy of watchful waiting in the management of intra-abdominal injuries was repudiated. World War II saw the adoption of principles and practices in the treatment of abdominal wounds that led to gratifying reductions in mortality and morbidity. It remained for us in the Korean campaign to refine, polish, and add to these principles the surgical knowledge and technics gained in the intervening war-free years. That the practices on which we built were solid was evidenced by our initial low morbidity and mortality. That the refinements we added were indeed worthy of adoption was indicated by an over-all reduction in mortality from 4.5 per cent in World War II to 2.4 per cent. This reduction was merely a reflection of the decrease in mortality among patients wounded in various specific regions, of which the abdomen was one of the most important.

One of the outstanding contributions to the surgical treatment of patients with abdominal wounds during World War II was that of Ogilvie,<sup>1</sup> who first advocated the technic of exteriorization of the wound in the colon. Second perhaps to this advance was excision of the coccyx with incision and drainage of the pre-sacral space for wounds of the rectum. These two technics alone led to the saving of thousands of lives both in World War II and in Korea.

## INCIDENCE

The importance of treatment of large intestine wounds cannot be over-emphasized. Every publication on abdominal trauma caused by war injuries lists the colon, either alone or in combination with other abdominal viscera, as one of the three most frequently injured intra-abdominal organs. It is estimated that wounds of the large and small intestine together comprise about 70 per cent of all intraperitoneal damage among casualties with abdominal injuries. This is to be expected because these organs occupy a major portion of the abdomen. Specifically, in World War II, Ogilvie reported 128 wounds of the colon in 381 abdominal

casualties—an incidence of 33.6 per cent. The Second Auxiliary Surgical Group<sup>2</sup> in World War II reported 1,106 colon wounds in 3,154 abdominal casualties—an incidence of 35.1 per cent. In the Korean conflict, the Surgical Research Unit<sup>3</sup> reported the colon injured 140 times in 402 abdominal casualties—an incidence of 34.8 per cent.

### FACTORS INFLUENCING MORTALITY

By themselves, statistics on incidence do not portray the true seriousness of wounds of the colon. Not only do such wounds produce a significant mortality, but, because they occur very frequently in combination with wounds of other organs, they also contribute significantly to the death rate from wounds of these other organs. It has, in fact, been shown repeatedly that with intra-abdominal wounds mortality will vary directly with the number of organs involved.

*Shock.* The greatest single mortality-producing factor in the combat zone is shock. Perhaps the three major causes of shock among battle casualties in Korea were: (1) severe exsanguination due to major arterial injury; (2) extensive damage to large muscle masses such as those of thighs and buttocks; and (3) massive fecal contamination of the peritoneal cavity. That the latter was of importance also in World War II was illustrated by Bradford and Campbell,<sup>4</sup> who in their report on fatalities incident to war wounds of the abdomen found that 19 of 91 deaths were secondary to shock from severe fecal contamination of the peritoneal cavity. That the presence of shock is an important, if not the most important, factor in mortality among battle casualties is shown by Wylio and co-authors,<sup>5</sup> who reported a case fatality rate of only 5.5 per cent in 903 patients with thoracoabdominal wounds not in shock on admission compared to a case fatality rate of 59.6 per cent among those who were in severe shock on admission.

Several other factors, either alone or in combination, influence mortality during war. Among these are the type of warfare, the modes of evacuation, the availability and use of antibiotics, and the experience of combat surgeons.

*Type of warfare.* In a static war, such as prevailed for so long in Korea, high-priority surgical installations did not move frequently. As a result, they were always well organized for the reception of casualties, and a minimum amount of time was wasted from admission to operation. Furthermore, their evacuation lines and procedures were so well standardized and understood that little time was lost in sending casualties to them.

*Modes of evacuation.* The more rapid and atraumatic the means of evacuation, the better is the condition of the seriously wound-

ed on arrival at a surgical installation. In Korea, because of U. N. air control and the type of terrain, helicopter evacuation was frequently used. This resulted in a marked decrease in the time lag<sup>6</sup> between wounding and operation as compared with World War II.

*Availability and use of antibiotics.* The statistics of the Second Auxiliary Surgical Group on thoracoabdominal wounds in the second World War show that coincident with the use of penicillin there was a drop in mortality of from 10 to 15 per cent. This by no means implies that antibiotics are a substitute for the application of sound surgical principles and practices in the initial treatment of casualties. Rather, antibiotics are a means of supplementing good surgical practice and extending its principles. Adequate supplies of all antibiotics were readily available in Korea and were extensively used. It became routine, in fact, for every casualty to receive penicillin at battalion aid stations, and this was supplemented, where indicated, by the broad-spectrum antibiotics.

*Experience of combat surgeons.* Every surgeon, both in World War II and in Korea, had to learn the principles of combat surgery by actual experience. With increasing experience, the mortality rate among the wounded on whom he operated decreased. The surgeon newly arrived in a combat zone leaves a trail of poorly débrided and infected wounds until, with continual practice, he learns to apply all of the correct principles and technics for an adequate débridement.

### DIAGNOSIS

Among battle casualties with abdominal wounds, diagnostic procedures are begun with an inspection of the patient to determine the location of wounds of entry and exit. On the basis of their location and the man's position at the moment of wounding, the trajectory of the missile through the body may be determined, and the probable organ damage estimated. Where only a wound of entry exists, anteroposterior and lateral roentgenograms serve to localize the retained metallic missile and thus give valuable information with regard to its trajectory and probable organ damage. In the absence of severe associated wounds, the presence of shock and its severity conveys valuable information with regard to the multiplicity of the intra-abdominal trauma for, generally speaking, there is a direct relation between the number of viscera damaged and the degree of shock. Abdominal splinting is a valuable diagnostic aid, but unfortunately it is not an invariable accompaniment of perforated viscera. Bowel sounds are usually absent, especially in casualties with perforated hollow viscera. One must never forget the digital rectal examination and, where indicated, sigmoidoscopic examination. This pro-

cedure becomes especially important in the diagnosis of wounds of the rectosigmoid and rectal colon, for these wounds most frequently are responsible for the finding of blood in the rectum. Where all other methods of producing a diagnosis of intra-abdominal injury have failed, débridement of the wound tract with or without recovery of the missile may indicate whether penetration of the peritoneum has occurred. In this procedure, the casualty is prepared as if for definitive surgery. The wound tract is débrided and, if penetration of the peritoneum is found, a definitive laparotomy is performed. In all suspected abdominal casualties where the diagnosis cannot be confirmed, exploratory laparotomy is indicated, for in young healthy adults in the heat of combat, symptoms and signs may appear late. By using the diagnostic procedures outlined above, the findings in no more than 2 or 3 per cent of laparotomies in Korea were negative. Pearson and co-authors,<sup>7</sup> however, reported that 8 per cent of explorations in 303 patients with suspected intraperitoneal wounds operated upon during World War II were negative.

#### TREATMENT

By the end of World War II, exteriorization of the colon for wounds was an accepted and obviously lifesaving procedure. This consisted of mobilization of the injured segment so that it could be brought through the abdominal wall without tension and held there as a loop colostomy by placing either a glass rod or suture tube beneath it and through the mesentery. A functioning colostomy was then established by either incising or unroofing the antimesenteric surface of the loop. Where the injury to the large bowel was extensive or on the mesenteric border, treatment consisted of division or resection of the wounded bowel with exteriorization of both ends as a spur for later crushing. Wounds of the intraperitoneal rectum and that part of the rectosigmoid colon that could not be mobilized for exteriorization were treated by closure of the perforation and the construction of a proximal, diverting spur type of colostomy.

In the Korean conflict the principle of colon exteriorization was adopted as standard procedure for wounds of that organ. An attempt was made to perform "closed loop" colostomies by exteriorizing the perforation and then suturing it so that the bowel could be dropped back intact and without anastomosis after four or five days. When a review of results indicated that about 90 per cent of these broke down or required subsequent opening because of obstruction at the abdominal wall, closure of the wounded loop was abandoned. At least one surgeon during World War II, Snyder,<sup>8</sup> attempted "closed loop" colostomies. He believed they were successful in 90 per cent of selected patients.

While most surgeons in World War II favored the use of a spur type of colostomy for complete fecal diversion, Poer<sup>9</sup> by the end of that war felt that spur construction should be abandoned because of the danger of crushing a poorly constructed spur and because he believed that the resistance developed by the local peritoneum was of such a degree as to render extraperitoneal colostomy closure unnecessary. In the Korean conflict only an occasional spur type of colostomy was constructed. Not only did we believe that local peritoneal immunity and antibiotic bowel preparation permitted intraperitoneal colostomy closure, but we considered that spur colostomies did not adequately divert the fecal stream. Instead, where a diverting colostomy was needed, we advocated, in Korea, that the bowel ends be separated by at least two inches of skin and peritoneum, either through two ends of one incision or through two separate stab wounds.

In both the Korean conflict and in World War II, the use of colostomies apparently solved the problem of how to treat wounds of the transverse and descending colon most expeditiously and with the greatest saving of life. Because of the liquid nature of the feces in the cecum and ascending colon, exteriorization of this portion of the bowel was attended by great morbidity and mortality due to skin excoriation and fluid and electrolyte imbalance. How best to treat wounds of the right colon remained controversial to the end of the second World War, and the same controversy flared anew in Korea.

Many different ideas prevailed among both British and American surgeons in World War II as to how best to handle wounds of the cecum and ascending colon. Thus, we find Welch<sup>10</sup> quoting the Second Auxiliary Surgical Group as having an early case fatality rate of 64.7 per cent when right colon wounds were treated by right hemicolectomy and double-barreled ileocolostomy. This rate later in the war was reduced to 51.7 per cent by performing a resection of the right colon plus anastomosis of ileum to transverse colon. On the other hand, Colcock<sup>11</sup> favored the double-barreled ileocolostomy spur because he believed anastomosis was time-consuming and, therefore, added to the patient's shock. Murray<sup>12</sup> thought that right hemicolectomy was a lethal procedure for "battle abdomens" and favored resection of the damaged segment only, with exteriorization of the ends associated with anastomosis of ileum to transverse colon.

Because of the diversity of acceptable procedures, it was deemed unwise to recommend one procedure as standard for all wounds of the right colon in the Korean conflict. The greatest success achieved by most surgeons was obtained by right hemicolectomy and anastomosis. Unfortunately, no statistics are

available to back this up. Small perforations of the cecum were treated either by closure or by exteriorization by means of a cecostomy. I had one patient with a perforation through the base of the appendix and cecum that was treated by appendectomy and appendicostomy.

In Korea, multiple wounds of the colon occasionally presented perplexing problems in management. When two simple perforations were present at a considerable distance from each other, it was recommended that the distal one be sutured and left in situ and the proximal one be brought out as a diverting colostomy. When the perforations were close together, it was recommended that both be exteriorized as a single loop colostomy with the perforations connected by incision of the intervening bowel. When the colon injury was extensive at multiple locations, it was recommended that resection and exteriorization be performed at the proximal site and resection plus anastomosis at the distal site. When the patient's condition was such as to preclude taking the time for anastomosis, it was believed that multiple resections with exteriorization at each site constituted the quickest and simplest procedure for extensive colon wounds in multiple locations.

### MORTALITY

When one considers the mortality for wounds of the colon in World War II, it must be recalled that the principle of exteriorization was being standardized and, as with any new procedure, the initial mortality was high. This was reflected in the mortality for the entire war, even though in the latter period of the war the mortality was decreased. A gratifying reduction in the mortality of colon wounds was effected in the Korean conflict as compared with World War II. Thus, in 1,106 wounds of the colon treated at the Second Auxiliary Surgical Group, the case fatality rate was 37 per cent. In Korea, 140 colon wounds reported by the Surgical Research Unit resulted in a 15 per cent case fatality rate. A personal communication from the medical statistics division of the Surgeon General's Office on the basis of as yet incomplete statistics indicates a case fatality rate of 15.9 per cent among 372 wounds of the colon and rectum in Korea. This parallels the roughly 50 per cent reduction in mortality of all wounded in the Korean conflict as compared with the earlier war.

### SUMMARY

The management of war wounds of the large bowel in Korea was based on the concept that whenever possible these wounds should be treated by exteriorization. Because this mode of therapy was based on practices initiated during World War II, these practices are reviewed and the changes instituted during

the Korean conflict are presented. As a result of these modifications and of certain influencing factors, there was a reduction in mortality of 50 per cent in large bowel injuries in Korea as compared with World War II.

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### NEW NAME FOR ARMY GRADUATE SCHOOL

On 1 November 1955 the school component of Walter Reed Army Medical Center was redesignated "Walter Reed Army Institute of Research." Since 1950 this component has been known as "Army Medical Service Graduate School."

No change will be made in the mission of this institution, according to Major General Leonard D. Heaton, MC, USA, Commanding General of the Center. It will continue to provide medical research and professional graduate training required by the U. S. Army to fulfill its role in the national defense.

Brigadier General John R. Wood, MC, USA, Commandant of the school since May 1954, will carry on his duties under two new titles. He will be Director of the Institute and Commandant of the Institute's education and training activities.



## ARMY EXPERIENCE CAN LEAD TO SECOND CAREER

In the past several months, many Regular Army Medical Corps officers who had completed over 20 years of service have retired voluntarily to accept top positions in the fields of medical teaching, administration, and research. Young medical officers should be aware that one of the most attractive features of the U.S. Army Medical Corps is this opportunity to enjoy two careers in one lifetime.

The following are only a few of the more recent retirees who have made significant contributions to military medicine and who have begun their second careers in responsible civilian positions.

\* \* \*

**DR. GEORGE E. ARMSTRONG**, *Vice Chancellor for Medical Affairs at the New York University and Bellevue Medical Center, New York, N. Y.*



After serving as a private in the Student Army Training Corps in World War I, Doctor Armstrong received his M. D. degree from the Indiana University School of Medicine in 1925. In the meantime, he

enlisted in the Indiana National Guard and rose to the rank of Technical Sergeant. Commissioned a First Lieutenant in the Army Medical Corps, Doctor Armstrong served at various Army posts overseas and in the United States prior to World War II. During World War II, he served as Assistant Theater Surgeon and later as Surgeon of the China Theater. His Army career was culminated by his appointment as Deputy Surgeon General of the Army in 1947 and as The Surgeon General in 1951.

\* \* \*

DR. WAYNE G. BRANDSTADT, *Assistant Editor, Journal of the American Medical Association, Chicago, Ill.*



Doctor Brandstadt entered the Army Medical Corps in 1930. He had received his M. D. degree from the University of Chicago in 1923. He subsequently was graduated from the Army Medical School, the Medical Field Service School, and the Command and General Staff School. In 1946, Doctor Brandstadt received his Master's degree in Public Health from the Johns Hopkins University and was subsequently certified by the American Board of Preventive Medicine and Public Health. His major assignment in World War II was as Commanding Officer of the 53d General Hospital in the European Theater of Operations. Following

World War II, Doctor Brandstadt was appointed editor of the *Bulletin of the U. S. Army Medical Department*, a post which he held until the medical publications of the Army, Navy, and Air Force were unified in January 1950. At that time, he joined the staff of the new publication, the *U. S. Armed Forces Medical Journal*, and subsequently became its editor-in-chief until his retirement in August 1953.

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DR. RAWLEY E. CHAMBERS, *Mental Director for the Texas State Hospitals and Special Schools, Austin, Tex.*

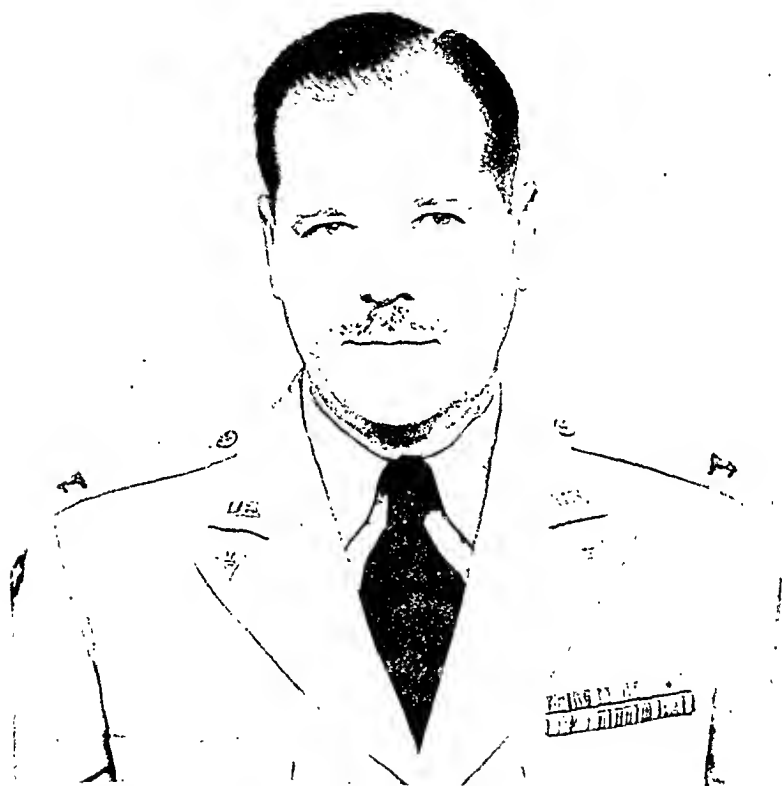


Doctor Chambers began his 29-year Army career in World War I as an enlisted man with the Field Artillery and eventually rose to become the Army's chief psychiatrist. He was commissioned a First Lieutenant in the Army Medical Corps after receiving his M. D. degree from the Ohio State University in 1926. During World War II he commanded the 12th Evacuation Hospital, the 77th Station Hospital, the 7th General Hospital, the VII U. S. Provisional Hospital Group, and the 805th Hospital Center, all in the European Theater of Operations. He was appointed Brigadier General and Chief of the Professional Division in the Office of The Surgeon General in 1952. At the same time, he served as Chief Consultant in Psychiatry and Neurology.

\* \* \*

DR. CHARLES L. LEEDHAM, *Director of Education, Frank E. Bunts Educational Institute of the Cleveland Clinic Foundation.*

A diplomate of the American Board of Internal Medicine, Doctor Leedham, a 1928 graduate of State University of Iowa College of Medicine, received wide experience at Army posts both in the United States and overseas areas. In World War II, he commanded the 48th Evacuation Hospital in the Ledo Road sector of the China-Burma-India Theater and later became Base Surgeon of the Base Section with headquarters



in Calcutta, India. While in his last assignment as Chief of the Education and Training Division in the Office of The Surgeon General, Doctor Leedham also served as Secretary of the American Medical Association Military Medical Section, and as The Surgeon General's representative on medical education to the Department of Defense, the National Intern Matching Plan, the MEND Committee of the Association of American Medical Colleges, as well as to accrediting authorities in medical educational fields.

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DR. JOHN HARRY KING, *Head of the Section of Ophthalmology of the Washington Clinic and Associate Clinical Professor of Ophthalmology, Georgetown University School of Medicine.*



Doctor King received his M. D. degree from Georgetown University School of Medicine in 1934, entered the Army Medical Corps in 1935 and specialized in ophthalmology, training at Walter Reed Army Medical Center and the New York Eye and Ear Infirmary. A diplomate of the American Board of Ophthalmology, Doctor King served in the Philippine Islands, Hawaii, and Italy, as well as four tours of duty at the Walter Reed Army Medical Center. His last tour of duty there was as Chief of the Ophthalmology Service, Director of Ocular Research, and Consultant in Ophthalmology to The Surgeon General of the Army. He has written about 35 scientific articles on the eye, is coauthor of a manual of eye surgery, and is the inventor of several eye instruments.

\* \* \*

DR. TOM F. WHAYNE, *Professor of Preventive Medicine, Department of Preventive Medicine and Public Health, University of Pennsylvania School of Medicine.*



After his graduation from the Washington University School of Medicine (St. Louis) in 1931, Doctor Wayne entered the Army Medical Corps in 1934. During his Army career, Doctor Wayne held several key assignments in the field of preventive medicine and twice was Chief of the Preventive Medicine Division in the Office of The Surgeon General. He studied at the Harvard School of Public Health from 1948 to 1950, where he earned degrees of Master of Public Health and Doctor of Public Health. He was certified a diplomate of the American Board of Preventive Medicine in 1949. He served as Military Advisor to the American Delegation to the First World Health Assembly in 1948 and to the Sixth World Health Assembly in May 1953.

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## CASE REPORTS

### Acute Hemolytic Anemia Complicating Infectious Mononucleosis

CHRISTOPHER C. FORDHAM, III, *First Lieutenant, USAF (MC)*

**I**NFECTIONOUS mononucleosis is a common cause for hospitalization in the armed services. The usual course of the disease is one of gradual but uneventful recovery. Among the complications which may make the individual patient a serious medical problem is the development of acute hemolytic anemia. This apparently is a rare event, there having been about 15 cases reported in the American literature at this writing.<sup>1-10</sup>

#### CASE REPORT

A 19-year-old airman was admitted to this hospital on 19 May 1955. Though somewhat vague about his symptoms, he apparently had been entirely well until 12 days before admission when he noted the onset of malaise, fatigability, and anorexia. Several days later, he developed postprandial nausea and vomiting and sensations of chilliness and feverishness. These symptoms abated somewhat after 2 or 3 days and the patient continued to carry out his regular duties as an electrician. Because of persistent listlessness and fatigability, however, he presented himself for medical attention. He had noted no definite changes in the color of his urine or stools. There was no history of recent drug ingestion or injection, with the exception of penicillin administered 4 to 5 weeks previously for treatment of a superficial skin infection. The past and family histories were noncontributory.

Physical examination on admission disclosed a thin, pale, white youth, chagrined at the prospect of remaining in the hospital. The oral temperature was 98.2° F.; the pulse, 75; and the blood pressure, 125/80 mm. Hg. The sclerae were nonicteric, the pharynx clear. The heart and lungs appeared to be normal. The abdomen was soft; the liver edge could be felt 2 cm. beneath the right costal margin and was slightly tender; there was minimal punch tenderness over the right costal margin. The spleen could not be palpated. Slightly enlarged, nontender lymph nodes could be felt in the anterior cervical, axillary, and inguinal areas.

Examination of the initial blood specimen revealed a total white blood cell count of 16,600 per cu. mm. with a differential count of 6 percent neutrophils and 94 percent lymphocytes, 40 percent of which were atypical, showing cytoplasmic vacuolation, indented nuclei, and serrated nuclear margins. Hemoglobin was 13.6 grams per 100 ml.; and

hematocrit, 42 ml. per 100 ml. Urine showed two-plus albumin and a few cellular elements. A serologic test for syphilis was positive with a cardiolipin quantitative titer of 1:8. Initial heterophil agglutination was 1:112; there was no absorption by guinea pig kidney. Sulfobromophthal-ein retention was 13.5 percent in 45 minutes.

During the first 2 days of his hospital stay, the patient had a moderately febrile course characterized by listlessness and anorexia, but he had no specific complaints. On the second hospital day, a peculiar phenomenon was noted. Blood obtained by routine venipuncture and allowed to clot invariably expressed serum which was discolored by hemolysis, whereas oxalated blood for hematologic study demonstrated clear plasma after centrifugation. Coombs' test at this time was negative. On the third and fourth hospital days, the patient's oral afternoon temperature exceeded 104° F. and although he remained mentally alert he was phlegmatic, denying specific complaints. On the fourth hospital day his skin and sclerae appeared slightly icteric and the serum bilirubin was 2.13 mg. per 100 ml. At that time the liver edge remained palpable and tender but the spleen could not be felt. On the morning of the fifth hospital day a repeat hemoglobin value was reported as 11.1 grams per 100 ml.; the hematocrit, 34 ml. per 100 ml.; and, for the first time, an area of hemolysis could be seen overlying the buffy coat in the oxalated blood specimen. Several hours later, a drop in the hemoglobin to 9.5 grams and the hematocrit to 30 ml. per 100 ml. was reported. The patient was placed on continuous intravenous drip, and intramuscularly administered ACTH, 40 mg. every 6 hours, was started. The next day he was clinically improved, subjectively and objectively. In vitro hemolysis remained evident in both the clotted and unclotted blood samples. The urine contained hemoglobin, but the output remained good and no crystals were observed in the sediment.

On the seventh hospital day, 2 days after the apparent onset of hemolysis, the hemoglobin reached its low point of 8.6 grams and the hematocrit, 28 ml. per 100 ml. The white blood cell count at that time was 8,000 per cu. mm. with 75 percent lymphocytes, half of which were atypical. Steroid therapy and fluids given intravenously were continued. On 27 May, the ninth hospital day and the fourth day after the onset of hemolysis, the patient had a stable hemoglobin and hematocrit, and a Coombs' test was positive. His urine output remained good and his spleen became palpable 1 to 2 cm. beneath the left costal margin. Osmotic fragility studies were normal and the reticulocyte count was 6 percent. The heterophil titer reached a maximum level of 1:448 with one tube absorption by guinea pig kidney and thereafter diminished. He was switched to cortisone orally given on the fourth day following onset of hemolysis, and the dose of this steroid was gradually reduced thereafter from its initial level of 200 mg. per day. His subsequent hospital course was one of uneventful recovery with the reversal of all abnormal physical and laboratory findings, including the cardiolipin microflocculation



rest. He was discharged from the hospital 21 June, and when seen in the clinic 3 and 6 weeks later had remained completely well.

*Comment.* It was clear soon after hospital entry that this patient presented clinical and laboratory features characteristic of infectious mononucleosis. Several days thereafter, an acute hemolytic process supervened, resulting in a striking reduction in the hemoglobin and hematocrit values within a matter of hours. Hemoglobinuria, reticulocytosis, and a positive antiglobulin test were demonstrated. Subsidence of the hemolytic process and uneventful clinical recovery were chronologically related to the institution of adrenal steroid therapy.

Infectious mononucleosis is one of a heterogeneous group of diseases occasionally associated with an acute hemolytic process. The term "symptomatic hemolytic anemia"<sup>11</sup> has been used to describe this relationship, implying that the hemolytic process is etiologically related to the underlying disease. Possible pathogenetic factors include autoimmune antibodies, hypersplenism, and the direct action of viruses.

The observation of hemolysis in the clotted blood specimens and its absence in the oxalated samples apparently presaged the onset of in vivo hemolysis and acute hemolytic anemia. There was a 3-day interval between this finding and the appearance of a detectable drop in the hematocrit; when the latter occurred, hemolysis could be observed in both the clotted and unclotted specimens. The significance of this observation is not understood.

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# Ainhum

ROBERT L. CHANCEY, *Major, USAF (MC)*  
BERNARD F. GIPSON, *Captain, USAF (MC)*

**A**INHUM, a chronic disease characterized by the formation of a groove around the base of a digit, usually the fifth toe, leading to eventual spontaneous amputation, is unusual in natives of the United States. Jacobs and associates<sup>1</sup> in a review of the literature up to 1950 found 54 reported cases in the United States and presented one of their own. Most of these cases occurred in southern Negroes. We have located reports of 12 other cases since then.<sup>2-4</sup> We wish to report another instance of this unusual condition seen in a young American Negro who spent most of his life in the Midwestern United States.

## CASE REPORT

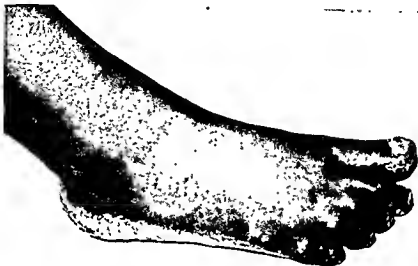
An 18-year-old Negro was admitted to the hospital 8 July 1955 with the complaint of a painful little toe of the right foot. This man was born in Tennessee. He lived there for 2 years, then moved to the Midwest where he remained until he joined the military service, 4½ months prior to hospital admission. Shortly after joining the military service he developed an "infection" of both feet. A few days later he noted pain on motion of the fifth toe of the right foot. Shortly after this he noted a small crease at the base of this toe. This gradually progressed until there was a deep groove involving the entire circumference of the base of the toe. The toe was painful, especially on walking, but the patient was able to continue with his military duties. The discomfort finally became so acute he sought medical care and was admitted to the hospital.

Family history revealed that the patient's father, one paternal uncle, and two brothers had thickening and scaling of the skin of the palms and soles. There was no other significant family history.

Examination revealed a moderately obese man who did not appear acutely ill. His blood pressure was 110/70 mm. Hg; pulse, 80; and temperature, 98.4° F. There was a deep fissure involving the base of the fifth toe of the right foot (fig. 1) but there was no evidence of any acute process involving the groove. There was hyperkeratosis of the palms and soles with a superimposed apparent dermatophytosis of the feet. The fifth toe of the left foot appeared normal. Oscillometric studies of the lower extremities were normal.

From U. S. Air Force Hospital, Lowry Air Force Base, Colo. Dr. Chancey is now at Beloit Clinic, 1146 Grant St., Beloit, Wis.

Serologic tests for syphilis and a urinalysis were negative. A complete blood cell count was within normal limits. The fasting blood sugar was 102 mg. per 100 ml., and no sickling of cells was noted at the end of 72 hours. Repeated cultures of scrapings from the feet did not reveal pathogenic fungi.



*Figure 1. Appearance of the right foot on the patient's admission to the hospital. There is a deep groove in the fifth toe.*

A roentgenogram of the right foot showed bony atrophy of the distal portion of the fifth proximal and distal phalanges (fig. 2).

Treatment by soaking in a 1:5000 solution of potassium permanganate produced improvement in the acute inflammation, but the groove involving the base of the fifth toe on the right foot was not influenced. Because of failure to improve on conservative treatment and because of continued pain the toe was amputated on 27 July 1955, and recovery was uneventful.

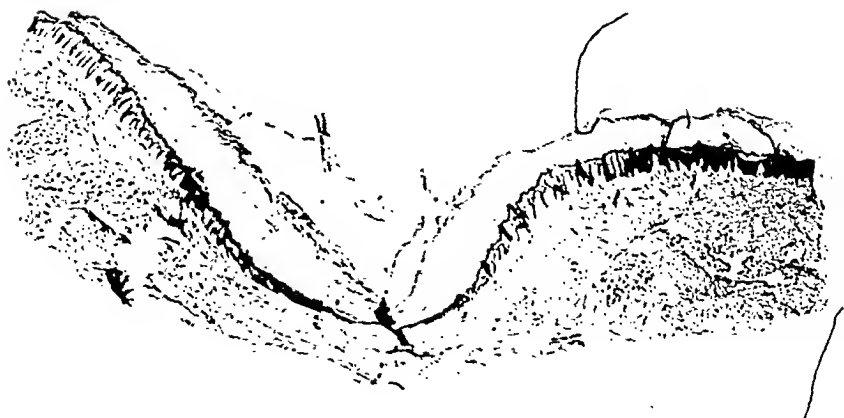
#### Pathologic findings

**Gross.** The toe measured 5.5 by 2.5 by 2 cm. in its greatest dimensions and weighed 11 grams. There was a fibrous band constricting the proximal phalanx. The top of the toe was swollen, blue to grayish in color and scaly. On sectioning, it was found that there was a fracture near the junction of the middle and distal thirds of the proximal phalanx.

**Microscopic.** Sections revealed severe hyperkeratosis and acanthosis of the epithelium (fig. 3). Although the constricting groove was easily recognizable on the sections there was no evidence of a definite fibrous band. In the subcutaneous tissue there were scattered agglomerations of inflammatory cells consisting mainly of lymphocytes, plasma cells,



*Figure 2. The bony changes are quite evident in this roentgenogram of the involved toe, and the circumferential groove can be seen in the soft tissue shadow.*



*Figure 3. Low-power magnification of section taken through the constricting groove of the toe.*

and macrophages. The walls of the blood vessels were thickened and the lumen narrowed, but there was no evidence of obliteration. The

toenail was normal. The bone above and below the groove showed osteolysis and chronic periostitis.

*Diagnosis:* Ainhum.

## DISCUSSION

Many conditions have been implicated as causative factors in ainhum. Among those mentioned<sup>1-4</sup> are leprosy, scleroderma, syringomyelia, pityriasis rubra pilaris, syphilis, hyperkeratosis of the palms and soles, and congenital hereditary factors. In the English language literature it is generally conceded that the cause of this condition is unknown. Shaffer<sup>2</sup> reported a case of ainhum in a white woman with diabetes mellitus and suggested that it was a symptom and not a disease entity. Kean and Tucker,<sup>5</sup> in a review of the literature, suggested three large divisions as regards etiology, *i. e.*, infectious, constitutional, and mechanical. They concluded that the cause of ainhum is unknown and the pathogenesis unclear. The racial factor was considered important. Davis and Hewer<sup>7</sup> suggested that dermatophytosis played a part. The case reported by Jacobs and associates apparently had its onset after a fungus infection of the feet. In the case reported here the annular constriction at the base of the toe occurred following the onset of apparent dermatophytosis of the feet. In addition, the patient presented here had hyperkeratosis of the palms and soles. It is probable that the occurrence of annular constrictive bands of the digits and dermatophytosis is fortuitous rather than the cause and effect.

The histologic picture was nonspecific.

This patient's findings lend further support to the suggestions that ainhum is a symptom which may occur in many conditions and is not a primary disease.

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# Unusual Cause of Backache

JOSEPH W. BATCH, *Colonel, MC, USA*

JOHN D. ASHBY, *Lieutenant Colonel, MC, USA*

**B**ACKACHE is a symptom of an organic, or at times a psychogenic condition and is not a disease or a diagnosis unto itself. The complaint of backache is so common that few people reach adult life without having back complaints at some time. The etiologic factors which have been described as responsible for backache are multiple. These include congenital anomalies, developmental defects, postural abnormalities, mechanical strain, trauma, epiphysitis, infections, toxic factors, arthritis, gout, paralytic and functional neurogenic lesions, visceral lesions, muscular and fibrous tissue affections, metabolic, nutritional, endocrine, allergic, climatic, circulatory, hematologic, neoplastic, gynecologic, obstetric, and urologic lesions.<sup>1-3</sup>

The following is a case of backache which recurred following an operation and is considered secondary to it. Although it is not a new cause for backache, the authors have not seen previous reports of similar cases.

## CASE REPORT

A 32-year-old officer was admitted to the neurology service of this hospital 26 January 1955, as a transfer from another hospital, complaining of low back pain with radiation of pain to the right hip and down the posterior aspect of the right thigh and calf.

The patient stated that he had been well until June 1942 when he lifted a heavy crate, developing pain in his low back. His back was taped and the pain subsided after 1½ weeks. In April 1943 while on duty in Africa, he fell from a truck, injuring his back. During the same year he had malaria and has had an annual recurrence ever since. Following his fall from the truck he had acute low back pain with radiation down the right leg and was hospitalized for 5 days, receiving conservative treatment. The pain abated and he was discharged from the service 22 August 1944.

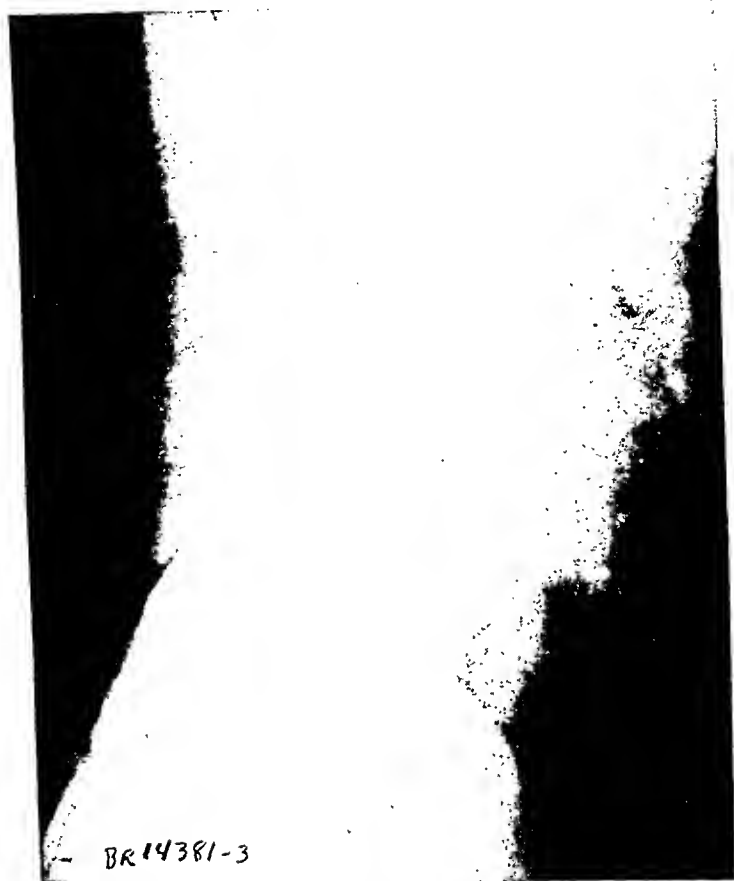
In 1946 after helping his father lift a boiler, he again experienced backache with radiation down the right lower extremity. The pain recurred intermittently after this but he was not hospitalized until May 1947 when he was admitted to a Veterans Administration hospital with the diagnosis of a herniated nucleus pulposus between the fourth and fifth lumbar vertebrae. On 21 September 1947 this herniated nucleus

pulposus was excised and a spinal fusion performed to ankylose the third, fourth, and fifth lumbar vertebrae to the sacrum. The patient obtained considerable relief from this operation and was clinically much improved. He applied for and was recalled to active duty 24 January 1952. He was free of pain until March 1954 when, while lifting some heavy equipment in Germany, he had an acute onset of back pain with radiation down the right lower extremity. He was admitted to the hospital 1 November 1954 where conservative treatment, consisting of firm bed, diathermy, massage, and exercises, was given without relief of pain. He was evacuated through medical channels to another hospital in the zone of the interior and later transferred to this hospital, arriving 26 January 1955.

Physical examination on admission to this hospital revealed a well-nourished man who walked with a slight limp and favoring the right leg. He stood with a list to the right. There was a well-healed, 6-inch, longitudinal scar slightly to the left of the midline in the lower lumbar and sacral region. The lumbar spine was semirigid and had less than the normal curve. Flexion, extension, and lateral bending were limited and caused slight discomfort. The apex of motion took place between the second and third lumbar vertebrae. Straight leg-raising tests were positive on the right at 30 degrees above the horizontal and on the left at 40 degrees, producing right calf pain. Deep tendon reflexes were obtained only with reinforcement but were equal bilaterally. The extensor of the great toe on the right was weaker than that on the left. There were no sensory or vascular changes in either lower extremity. There was no muscle atrophy or muscle spasm of the right lower extremity compared with the contralateral extremity. There was no tenderness over the posterior tibial or sciatic nerves bilaterally but marked tenderness over the right superior gluteal nerve and slight tenderness over the lower lumbar spine, most marked at the interspace between the fourth and fifth lumbar vertebrae. Admission laboratory studies, including hematology, urinalysis, and serology, were reported within normal limits.

The admission roentgenogram of the chest was normal. Roentgenograms of the lumbosacral spine demonstrated evidence of the surgically performed spinal fusion extending from the third lumbar vertebra to the sacrum. There were several areas of pseudarthrosis between the fourth and fifth lumbar vertebrae, the fifth lumbar vertebra and the sacrum, and the major bony segment extending from the sacrum up to the fourth lumbar vertebra (fig. 1).

On 31 January 1955 the patient developed a febrile course and was treated for a recurrence of malaria which promptly responded to therapy. On 18 February 1955 he was referred to physical medicine service and placed on therapeutic swimming. A myelogram on 24 March 1955 revealed a marked constriction in the frontal projection and a dorsal filling defect just beneath the lamina of the fifth lumbar vertebra with narrowing of the spinal canal to about 2 mm. (figs. 2 and 3).



*Figure 1. Lateral roentgenogram of the lumbar spine demonstrating spinal fusion and areas of pseudarthrosis.*

The patient was transferred to the orthopedic service on 28 March 1955 for treatment. On 31 March 1955, under general (open oxygen) ether anesthesia, the previous operation area was explored. It was found that the tibial graft previously used for spinal fusion had united to the sacrum but was ununited proximally and below to the fourth and fifth lumbar vertebrae. This bone was separated from the sacrum with an osteotome and excised along with the fibrous tissue surrounding it. This exposed two fragments of bone extending between the pedicles of the fifth lumbar vertebra corresponding to the position of its lamina. The fragments of bone were irregular in contour and freely movable. The one on the right extended to and surrounded the fifth lumbar nerve root. These fragments of bone were excised by sharp dissection. It was noted that they were compressing the dura and cauda equina. Beneath the bony fragments there was additional cicatricial tissue circumferentially constricting the cauda equina and the right fifth lumbar nerve root. This fibrous tissue was carefully dissected free from the cauda equina and



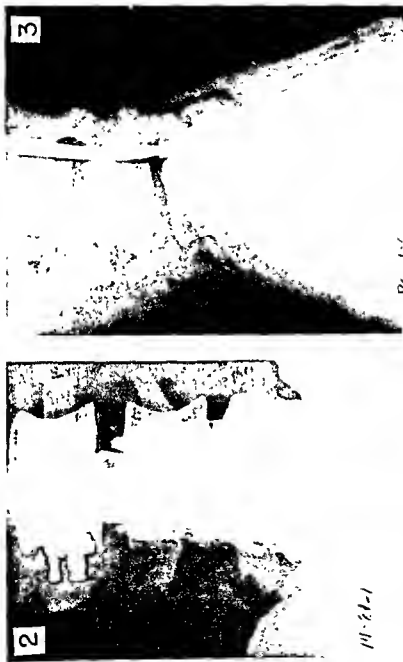


Figure 2. Posteroanterior projection of lumbar myelogram demonstrating constriction at the level of the fifth lumbar vertebra. Figure 3. Lateral projection of lumbar myelogram demonstrating marked narrowing of the spinal canal due to bony projections.

the right fifth lumbar nerve root. The fifth lumbar nerve root on the left and first sacral roots bilaterally were free. The disk spaces between the fourth and fifth lumbar vertebrae and the first sacral vertebra were inspected and injected with one-half ml. of saline and found to be intact. An H-shaped graft was removed from the posterior ilium on the right along with additional cancellous bone. The articular facets between the fourth and fifth lumbar vertebrae and the fifth lumbar vertebra and the sacrum were excised of articular cartilage and cancellous plugs of bone impacted in the defect. The H-shaped graft was placed to fit firmly between the spinous process of the fourth lumbar vertebra and the first sacral segment. Additional cancellous bone was placed about the H-shaped graft to reinforce the fusion, and the wound was closed.

Following surgery the patient was free of the back pain which had radiated down the right leg and his convalescence was satisfactory and uneventful. He was asymptomatic and returned to duty 16 June 1955.

### DISCUSSION

The recurrence of pain following operation for herniated nucleus pulposus is frequently stated to be due to an extension of additional disk material from the same disk space to a herniation at another level which may have been overlooked or which developed subsequently following operation or due to cicatricial tissue which may develop around a nerve root subsequent to the surgical intervention. When disk excision is accompanied with an immediate spinal fusion, pseudarthrosis of the fusion is usually considered to be the causative factor producing the continued complaint of back pain.

Our patient had only slight backache; his major complaint was pain in his right hip which radiated down to his right calf. On re-exploration, the L4 and L5 disk spaces appeared normal to inspection and were considered to be intact when not more than 0.5 ml. of saline could be injected into them. There were multiple areas of pseudarthrosis in the previously performed spinal fusion but these were not considered to be the cause of the patient's pain. It seemed that at the time of initial exploration and fusion the major portion of the lamina of the fifth lumbar vertebra had been removed and cancellous bone placed directly on the dura as a bed for a cortical graft. This cancellous graft material produced compression and the formation of a constricting band of fibrous tissue around the cauda equina and fifth lumbar nerve root on the right, resulting in continued low back pain with radiation down the right lower extremity.

This case emphasizes the care that must be exercised in performing a satisfactory spinal fusion so that it does not act as a cause for continued backache. The advisability of performing an immediate spinal fusion at the time of performing laminectomy for displaced disk is questionable.

Where there is a recurrence of backache with or without sciatic radiation following spinal fusion, the surgeon must consider the fusion as causative in his differential diagnosis and rule it out by obtaining myelograms to determine if there is or is not compression on the cauda equina or nerve roots from the bone mass of the spinal fusion.

### SUMMARY

A patient who had backache with radiation of pain down his right lower extremity was benefited initially by exploration and spinal fusion only to later develop slight backache with radiation of pain down the right calf. The spinal fusion was considered to be responsible for producing compression of the cauda equina and right fifth lumbar nerve root with a recurrence of the patient's symptoms. The patient's symptoms were relieved by a second operation.

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### THEORETICAL THERAPY

Are we not prone to accept a drug as effective in treatment because it ought to work rather than because it does work? Undoubtedly we are. Is there not a tendency to be convinced that because a drug reduces gastric acidity it does heal gastric ulcers, that because a drug increases cardiac output it benefits cases of heart failure, or that because a drug kills micro-organisms in a Petri dish it will kill them just as well in a living patient? The theoretical and laboratory tests for the effects of treatment are an essential part of clinical research and are responsible for many brilliant advances in therapeutics, and doctors must be on guard against being converted too readily to a line of treatment by theoretical arguments until these are supported by practical clinical tests.

—RICHARD ASHER, M. D.  
in *British Medical Journal*  
p. 460, Aug. 21, 1954

# Rupture of Interstitial Pregnancy With Delayed Diagnosis

ALAN DAVIDSON, *First Lieutenant, USAF (MC)*

JOHN A. HENDERSON, *Major, USAF (MC)*

COURTLAND BERRY, *M. D.*

**T**HIS case is considered worthy of report because it concerns a patient who was operated on for a ruptured interstitial pregnancy about 25 days after it is believed rupture occurred.

## CASE REPORT

A 32-year-old woman was admitted to the hospital on 12 February 1955, with the chief complaint of pain of one day's duration in the right upper quadrant of the abdomen and right side of the back. Her last menstrual period had occurred on 26 October 1954, making her 15½ weeks pregnant. She apparently had been well until 1800 hours the day prior to admission, when she suddenly developed abdominal pain. By midnight, the pain had become so severe that she had sought the aid of a local physician. The pain was described as midabdominal and radiating to the right side. The patient was unable to lie on her right side. She was given an injection of 50 mg of demerol (brand of meperidine hydrochloride), which failed to relieve the discomfort, and she remained uncomfortable throughout the night. At 1100 hours the pain became increasingly severe and the patient was admitted to this hospital.

The patient stated that since the onset of pain she had felt weak and had moderate malaise, but had at no time fainted. No vaginal bleeding or uterine cramps were noted. Past history revealed that she had had two normal pregnancies with spontaneous deliveries. She denied any miscarriages or intrauterine manipulations. Systemic review up to the present illness was entirely negative.

Physical examination revealed a thin, well-developed woman in moderate distress. Examination was entirely negative except for the following: Blood pressure, 100/60 mm Hg; pulse, 110, regular and strong. Abdominal examination revealed mild pain to deep palpation in the right upper quadrant and a mass which apparently originated from the pelvis, rose to one cm above the umbilicus and seemed to deviate to the left. There was slight tenderness in both flanks. There was no

rebound tenderness, rigidity, or muscular spasm. The liver, spleen, and gallbladder were not palpable. Pelvic examination revealed a soft, bluish, nondilated cervix. There was no evidence of vaginal bleeding. Bimanual examination confirmed the fact that the abdominal mass was the uterus, which was believed to contain a four-month fetus and a fibroid in the left cornu.

Laboratory studies revealed a hemoglobin of 8.5 g/100 ml, a red blood cell count of 2.02 million, and a white blood cell count of 18,900 per  $\mu$ l with a differential of 94 per cent polymorphonucleocytes and 6 per cent lymphocytes. Sedimentation rate was 20 mm per hour. Urinalysis was negative.

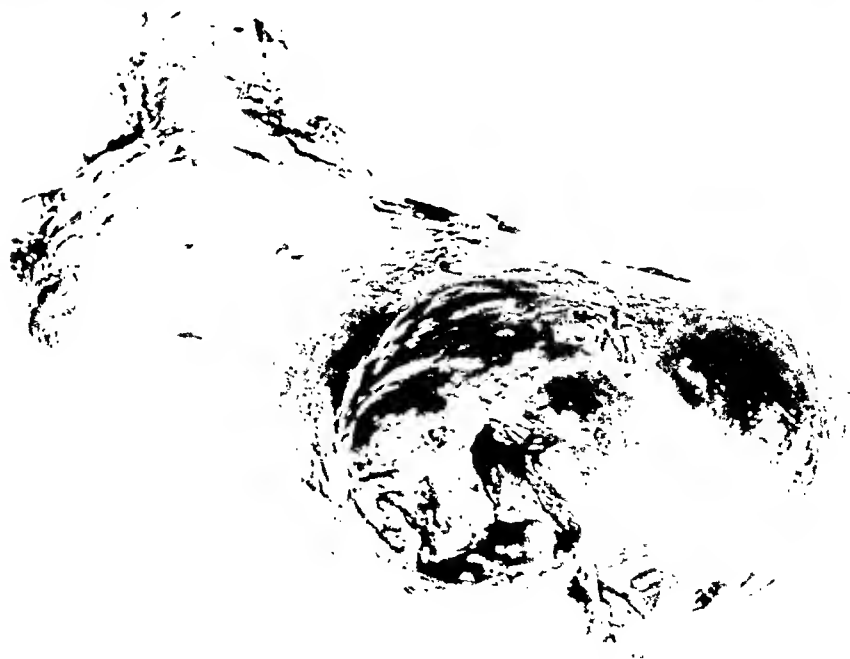
The patient was admitted to the surgical ward with a possible diagnosis of acute cholecystitis. She was placed on absolute bed rest, antibiotics, and mild sedation. The temperature, which had been 100° F on admission, gradually became normal by the next day. The hypogastric and right upper quadrant pain of which the patient initially complained gradually subsided, although there was abdominal tenderness to deep palpation. She had normal bowel movements and no urinary tract complaints. On 20 February, nine days after the onset of illness, the patient complained of mild lower abdominal cramps, and some vaginal spotting was noticed for the first time. On 22 February the bleeding continued and it then became bright red for the first time. The patient developed abdominal cramps and passed some tissue which was sent to the laboratory for examination. The bleeding continued and on 23 February the patient was given a blood transfusion. The bleeding gradually subsided, although the patient continued to have intermittent abdominal pains and cramps and a passage of a moderate amount of blood for the next 10 days. On 7 March the laboratory reported that the tissue specimen was degenerating decidual tissue and blood clot. No intact villi could be identified.

Pelvic examination at this time revealed the uterus to be smaller than it had been on admission. The cervix was 50 per cent effaced and patulous, and there was mild spotting from the os. There was no pain on movement of the cervix. An intravenous pyelogram revealed a fetus lying superior to the bladder (fig. 1). The preoperative diagnosis of abdominal pregnancy, possible ruptured interstitial pregnancy, was made.

On 9 March, 27 days after her initial onset of pain, and after a transfusion of whole blood, an exploratory abdominal laparotomy was performed. In the peritoneal cavity, 300 to 500 ml of old, clotted blood were found. The sigmoid was adherent to the uterus, but was freed by blunt and sharp dissection, revealing a rent in the uterus about 2 or 3 cm in diameter (fig. 2). The sigmoid had apparently sealed off this rent and prevented bleeding from it into the abdominal cavity. Further exploration revealed the fetus lying anterior to the uterus and over the bladder. Inspection of the tubes and ovaries revealed them to be per-



*Figure 1. Roentgenogram (pyelogram) with dye in bladder demonstrating fetus in transverse. Its lateral position suggests abdominal pregnancy.*



*Figure 2. Total abdominal hysterectomy revealing the ruptured area of a 16-week interstitial pregnancy.*

fectly normal. A total abdominal hysterectomy was performed. The patient's postoperative course was completely normal, and she left the hospital in good condition on her tenth postoperative day.



*Figure 3. Ruptured interstitial pregnancy: The uterus is on the left; the fetus, adherent to the superior surface of the bladder, is on the right. Tissue adjacent to fetus consists of fatty tissue and blood vessels with a very pronounced lymphocytic infiltration. No placental villi or true decidual tissue are identified.*

### Pathology Report

Gross examination of the surgical specimen (figs. 3 and 4) revealed a uterus measuring 8 cm in length and 6 cm in width. In the left cornu there was a large mass, dark reddish purple in color and measuring 8 cm in its greatest diameter. The mass was ruptured in one area where irregular nodules of dark reddish purple tissue were identified. Upon opening the uterus, the cervix appeared normal to gross inspection. The endometrial cavity was small and contained a moderate amount of blood clots. An amniotic cavity was identified within the large mass in the cornu.

Microscopic examination of the myometrium adjacent to this area disclosed marked swelling of the individual fibers, with a permanent decidual reaction in some areas. Large numbers of placental villi were noted. The villous processes were surrounded by blood clot and exhibited marked degeneration. The area adjacent to the gross rupture revealed degenerating fragments of decidual tissue and myometrium.



Figure 4. Cross section of uterus showing separate endometrial and amniotic cavities.

#### SUMMARY

In a case of rupture of an interstitial pregnancy of 16 weeks' gestation, rupture apparently occurred about 1 month prior to laparotomy. Vaginal bleeding occurred for the first time about 10 days after the rupture. At operation the sigmoid was found to be adherent to the opening in the uterus.

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*It's well known that every university faculty has arteriosclerosis; it is not so well known that the students have it also. —Martin T. Fischer*



# Multiple Hereditary Cartilaginous Exostoses With Polyposis of the Colon

PETER ZANCA, *Colonel, MC, USA*

**T**HE combination of multiple cartilaginous exostoses and polyposis of the colon is extremely rare. A thorough search was made of the available literature and no identical case report could be found. The closest associated pathologic condition was reported recently by Plenk and Gardner<sup>1</sup> who described osteomatosis, an hereditary disease of membranous bone formation, in conjunction with polyposis of the colon. Nine cases of this type have been recorded.

The bone lesions in the case described herein had their origin in the cartilage cells of the epiphyseal plates; true exostoses, therefore, differ from osteomatosis, which has its origin in disturbed formation of membranous bone.

Whether the combination of multiple cartilaginous exostoses with polyposis is coincidental or is based on a combined hereditary dominant gene is unknown. The genealogy of our patient was not investigated.

## CASE REPORT

A 40-year-old white woman was admitted to this hospital for removal of polyps of the sigmoid colon. For 3 months prior to admission she had complained of abdominal pain in the left lower quadrant. Past history revealed that for many years she had had multiple exostoses involving the long bones and spine.

Sigmoidoscopic examination failed to reveal any evidence of polyp formation. Routine barium enema with double-contrast air study of the colon revealed two constant, smooth, rounded, radiolucent areas; each measured about 0.8 cm. in diameter and involved the sigmoid colon. The remainder of the large bowel appeared normal (fig. 1).

A skeletal survey showed the skull to be normally developed, and there is no evidence of osseous lesions involving the cranium, facial bones, or bones of the hands, feet, or ribs. Multiple small and large sessile and pedunculated exostoses with cartilaginous tips were seen projecting into the soft tissues bilaterally on the diaphyseal side of the epiphyseal plates of the long bones. These included the tibia, fibula, radius, ulna, and femur. The bony projections extended outward away

*From Tokyo Army Hospital, APO 500, San Francisco, Calif.*



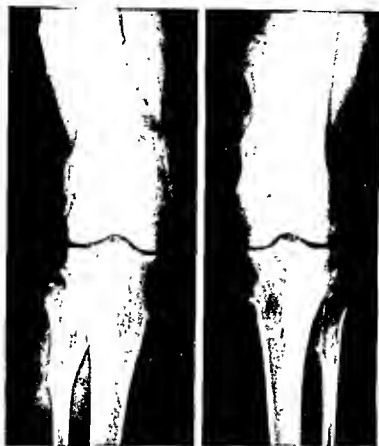
*Figure 1. Double-contrast air study of colon demonstrating two smooth, rounded polyps involving the sigmoid flexure.*

from the adjacent joints. There was some deformity of the ends of the bones with widening but there was no evidence of shortening (figs. 2 and 3). An osteochondroma protruding laterally from the neural arches of L-4 and L-5 and a small sessile exostosis involving the lateral margin of the right ilium were seen (fig. 4). The roentgenologic findings were characteristic of hereditary multiple cartilaginous exostoses.

At operation, the colon was palpated and no polyps could be felt except those in the sigmoid colon. One polyp was excised and a second was fulgurated with coagulating current. The patient's postoperative course was uneventful. The pathologic report was adenomatous polyp, benign.

#### DISCUSSION

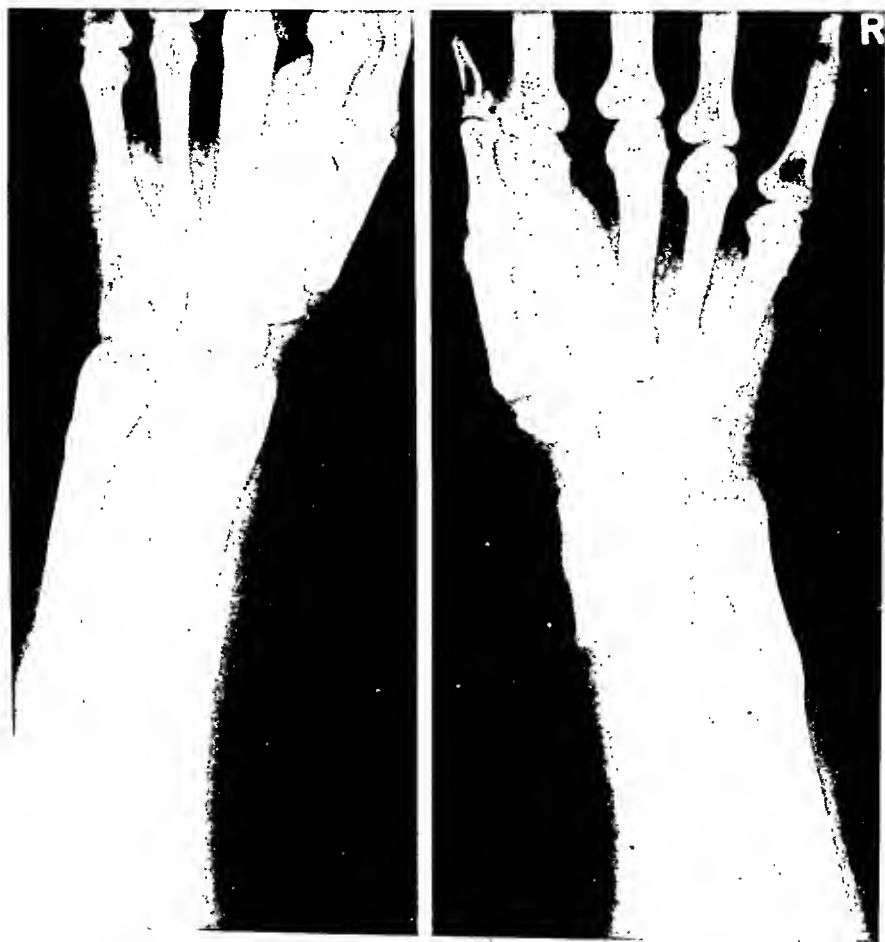
Plenk and Gardner described the hereditary pattern of osteomatosi (leontiasis ossea) associated with polyposis of the colon. Four of six of their patients had cranial or facial bone osteomas plus cortical changes in the long bones. The authors noted that the associated changes in the long bones were unusual and interesting. These tumors, however, consisted of solid bone and lacked



*Figure 2. Multiple cartilaginous exostoses involving the distal ends of the femur and proximal ends of the tibia and fibula.*

"areas of cartilage." They concluded that, in their cases, the changes in the long bones were confined to periosteal bone formation and that "a disturbance of membranous bone formation" is the causative basis of the disease. The authors cite Billings and Ringertz,<sup>2</sup> who reported a patient with tumor of a rib, and Reiss,<sup>3</sup> who mentioned the femur as being involved in three patients and the fibula in one.

In our patient the changes involving the long bones and spine presented the typical characteristic findings of hereditary, benign, multiple cartilaginous exostoses. Radiographically, the osteochondromatous tumors presented the classical bone projections with rarefied cartilaginous tips. There was no evidence of leontiasis ossea or of cranial, facial, or rib involvement. Two benign polyps were surgically removed, one of which was studied by the



*Figure 3. Multiple cartilaginous exostoses involving the distal ends of the radius and ulna.*

pathologist. On palpation the surgeon was unable to locate any other polypoid lesion in the colon, and the routine barium enema and double-contrast air examination failed to demonstrate any other lesion in the colon.

Multiple cartilaginous exostoses is known as a congenital and hereditary disease which involves bones ossified in cartilage and which, as a result of defective modeling of the bone, results in osseous deformities with exostoses.

The development of polyposis of the colon is based on a familial predisposition to this disease. The polypoid lesions may be found in early childhood but frequently are not diagnosed until later life. In view of the absence of any underlying inflammatory disease of the large bowel, the polyp formation in this patient is considered as being of hereditary origin.



Figure 4. An osteochondroma involving the neural arches of L-4 and L-5 is clearly demonstrated.

### SUMMARY

A case of hereditary multiple cartilaginous exostoses associated with polyposis of the colon is reported. No identical case description could be found in the available literature.

The pathologic condition most similar is that of osteomatosis (leontiasis ossea) with polyposis of the colon. The latter disease has a hereditary pattern. The genealogy of the patient was not investigated.

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# Clinicopathologic Conference

Brooke Army Hospital, Brooke Army Medical Center,  
Fort Sam Houston, Tex.\*

## ANURIA

**Summary of Clinical History.** This 33-year-old white male of Latin-American extraction was admitted to the hospital 18 April 1952 with the chief complaints of anuria and Hansen's disease.

The patient was well until 5 April. At that time he had a temperature of 101° F, which continued for three days. He then developed diarrhea and abdominal cramps which lasted until 12 April, when he felt well but weak. On 13 April he developed hiccoughs. Two or three days prior to the onset of the present illness the patient had consumed several beers. He also told his wife that for three weeks prior to onset he had been cleaning motors at work with a "gas" which he thought was carbon tetrachloride. He further stated that several of his fellow workers "felt sick."

The patient was an electrician. He had had military service in North Africa and Italy during World War II, and was discharged in 1944. He used alcohol occasionally and did not use tobacco. He had been given diasone (brand of sulfoxone sodium) therapy at Carville, La., until 1947 and intermittently after that by a local physician. His last medication had been in the preceding December. His father died of heart disease; his mother, two siblings, wife, and child were living and well. There was no other history of familial diseases. The patient had a slight shrapnel wound on the leg in World War II, and had had no operations. He had had the usual childhood diseases, and pneumonia in 1944. Hansen's disease was diagnosed in 1943. He was discharged from Carville in 1947 as an arrested case.

Review of systems was negative except for the genito-urinary system. The patient had had a "mild kidney disease" of unknown type in 1946 while at Carville. Several months prior to the pres-

\*Brig. Gen. Stuart G. Smith, MC, USA, Commanding General. From the Laboratory Service, Col. Carl J. Lind, MC, USA, Chief.

ent illness he had noted a sharp, "knife-like" intermittent pain in his right side. He also noted swelling of feet, nausea, vomiting, and a bad taste in his mouth. His urine showed pus and blood. He was treated with penicillin and the symptoms subsided.

**Physical Examination.** The patient was a well-developed, well-nourished Latin American appearing acutely ill, slow in speech, and confused in thought. He was 5 feet 10 inches in height; his weight was 185 pounds average, 208 pounds maximum, and 189 pounds at the time of examination. His pulse was 108, respirations, 26; temperature, 99.8° F; and blood pressure, 142/88 mm Hg. Head, neck, eyes, ears, teeth, and throat were negative. His tongue was dry and hard, and there was a uriferous odor to his breath. Chest expansion was equal and normal bilaterally. The lungs were clear to auscultation and percussion, and the heart was entirely normal. There were no masses or tenderness in the abdomen, and no hernias. The genitalia were those of a normal adult male, and the rectum and prostate were normal. There was definite bilateral costovertebral-angle tenderness. Examination of the extremities was negative. The nervous system was normal except for a clouded sensorium. There were areas of raised macular lesions over the skin of the chest, abdomen, and flanks. A slight icterus was also noted. The lymphatic system was normal.

**Course in Hospital.** The patient was catheterized on the day of admission and 5 ml of dark urine were obtained. On 19 April scrapings of skin lesions of the chest were positive for acid-fast bacilli. The patient was dialyzed in an artificial kidney for 6 hours and 15 minutes on 20 April. On 22 April his general condition was improved and sensorium cleared. A biopsy of the liver (by needle puncture) was done and reported as follows: "This presents a rather unusual picture. There is marked pleomorphism of liver cells suggesting a remarkable degree of regeneration. The appearance is not typical for either toxic or viral hepatitis. There is, in addition, a considerable degree of arteriosclerosis and we wonder whether the patient has hypertension." On 30 April the patient was running a 99-100° F temperature, but otherwise was feeling well. A biopsy of the skin was reported as showing Hansen's disease. The following day the urine showed many bacteria. Temperature was responding to penicillin, and the patient was quite alert. By 9 May, however, the patient was running daily fevers. The skin showed exacerbations of lepromatous lesions. Tender nodes were noted in the right groin. Fluids were forced in an attempt to bring down the blood urea nitrogen and the nonprotein nitrogen. By 26 May, the temperature was 102° F, and there were marked exacerbations of skin lesions. The patient was running a spiking temperature on 28 May. No foci of infection were found. The sensorium was

cloudy and movements were sluggish. On 6 June his condition was the same. Dependent edema was noted. The next day the patient had an urticarial reaction to a blood transfusion. The reactions responded to Benadryl (brand of diphenhydramine hydrochloride). On 9 June the urinary output dropped below 500 ml. Temperature, however, was normal, and the skin lesions were less noticeable. On 12 June the patient was drowsy and sluggish. Output was zero. On 18 June the patient was running a rapid downhill course. Dependent edema was increasing. He was extremely weak and lethargic on 20 June and experienced two severe Jacksonian convulsions. On 21 June he was dialyzed in an artificial kidney for 8 hours and 15 minutes. The following day his general condition was the same, and on 23 June his mental condition was less confused. The urinary output was scanty. On 24 June he had several severe convulsions. On 29 June his convulsions were poorly controlled by sedation, and he died on 7 July, 80 days after admission to the hospital.

**Laboratory Studies.** Electrocardiograms on 18, 19, 21, 22, and 23 April showed normal tracings. On 26 April there was a borderline tracing. The pattern was not diagnostic, but was compatible with electrolyte imbalance. On 29 April and 1 May the pattern was the same. Tracings of 16 and 19 May were normal. On 13 June the tracing was abnormal, with prolonged Q-T interval, T-wave changes, and low voltage suggestive of hypokalemia. Tracing of 20 June showed slight regressive changes from that of 13 June.

On 11 June a blood smear showed marked hyperchromia, marked anisocytosis, and slight poikilocytosis. On 19 April the serum bilirubin was 0.8 mg per 100 ml; total protein, 4.1 (albumin 3.1, globulin 1.0) grams per 100 ml. On 22 April the serum bilirubin was 0.4 mg per 100 ml; total protein, 4.2 (albumin 2.0, globulin 2.2) grams per 100 ml. The thymol turbidity was 1.25; cephalin-cholesterol flocculation was negative. Total cholesterol was 281 mg per 100 ml on 12 June.

Urinalyses consistently showed 2 to 3 plus albumin; the sugar was negative. Microscopically, there were 10 to 20 white blood cells and 5 to 20 red blood cells per high power field. Occasional bacteria were noted. On two occasions the urine was grossly bloody.

The hematologic findings and excretion and electrolyte studies made during the period of hospitalization are summarized in tables 1 through 3.

Investigation by authorities at the patient's place of employment revealed that the cleaning material used was trichloroethylene, in the cold state. The cleaning operations were conducted in essentially open space. Halide detection tests indi-



TABLE 1. *Hematologic findings*

Date	White blood cells/ $\mu$ l	Polymorpho-nucleocytes (%)	Lympho-cytes (%)	Red blood cells/ $\mu$ l	Hemo-globin (g/100 ml)	Hemato-crit (ml/100 ml)
18 April	13,900	78	20	—	12.0	38
22 April	—	—	—	—	11.5	36
7 June	17,400	92	8	—	7.0	—
9 June	—	—	—	—	9.0	—
11 June	11,100	76	24	2,300,000	7.0	—
13 June	—	—	—	—	16.0	—
17 June	—	—	—	—	18.0	—
3 July	29,000	94	6	2,700,000	3.0	—

TABLE 2. *Excretion studies*

	Urea clearance (ml/min)	Creatinine clearance (ml/min)	Intake (ml)	Output (ml)
Normal	+80	+120		
18 April	—	—	2,000	0
19 April	—	—	0	150
20 April	—	—	50	0
21 April	—	—	600	0
22 April	—	—	700	0
23 April	—	—	750	300
24 April	—	—	1,600	600
25 April	—	—	1,100	850
28 April	—	—	1,700	600
29 April	1.9	2.5	2,000	2,000
30 April	—	—	3,250	1,700
1 May	—	—	2,680	3,300
2 May	5.9	6.6	2,730	3,190
3 May	—	—	2,160	2,350
6 May	3.0	3.8	—	—
9 May	3.7	5.5	—	—
13 May	4.5	5.1	—	—
16 May	8.7	8.5	—	—
20 May	14.8	14.7	—	—
27 May	6.1	6.3	—	—
9 June	—	—	—	500
17 June	3.1	3.2	—	0
23 June	—	—	—	100

TABLE 3. *Electrolyte studies*

	Sodium (meq/l)	Potassium (meq/l)	Chloride (meq/l)	CO <sub>2</sub> (meq/l)	Blood urea nitrogen (mg/100 ml)	Creatinine (mg/100 ml)	Urea-nitrogen (mg/100 ml)	Phosphorus (mg/100 ml)
Normal values	135-137	3.5-5.5	100-110	25-30	10-20	1-2	25-40	4.0-6.5
18 April	119	5.3	131	15.8	254	-	-	-
19 April	109	3.5	124	10.9	244	-	-	-
20 April:								
Predialysis	116	4.8	87	9.5	205	14.5	-	9.42
Postdialysis	128	3.6	91	18.5	47	5.56	-	3.0
22 April	133	3.6	91	22.5	62	8.22	-	4.53
25 April	157	4.3	95	20.0	53	10.9	-	-
29 April	127	4.3	95	-	127	-	157	-
2 May	133	4.2	104	15.7	110	11.2	-	-
6 May	132	4.3	103	14.6	122	11.4	-	-
9 May	132	4.7	103	11.3	134	12.0	155	-
13 May	137	5.3	105	12.4	91	11.5	155	-
16 May	144	5.5	107	15.3	77	8.14	197	-
20 May	138	5.4	112	10.1	54	-	70	-
23 May	133	4.9	114	16.7	56	5.99	-	-
12 June	124	4.5	95	14.8	77	12.0	-	-
21 June:								
Predialysis	127	5.3	103	13.7	111	11.0	129	-
Postdialysis	130	3.4	101	22.8	45	4.9	40	-
24 June	122	4.7	91	19.0	57	6.3	-	-
27 June	122	4.5	87	18.0	58	9.9	-	-
1 July	122	4.7	-	15.0	65	10.7	-	-

cated that the concentration of trichloroethylene vapors in the atmosphere directly over the cleaning tank was less than 50 p. p. m. No concentration of the vapor could be detected in the working area immediately adjacent to the vat. Thirty other workers had been engaged in similar operations for months with no toxic manifestations.

### DISCUSSION

Doctor Haymon:\* It is a very great pleasure to be here, as it is to go to any Army hospital. You always learn more than you teach, I think. I was made an expert in tropical medicine by order of the Surgeon General, but not on the basis of any previous training. Unfortunately for this afternoon's discussion, there were not very many cases of leprosy in the American Army, at least not that I came in contact with.

This man was 33 years old. He was admitted in April with a diagnosis of anuria and Hansen's disease. He had been discharged from the Army with a diagnosis of leprosy in 1944; he had been treated at Carville intermittently with diasone, and had been discharged as an arrested case. He apparently got along quite well until between 5 and 8 April when he had some kind of febrile illness with a few days of diarrhea and abdominal cramps, followed by some further malaise. That was about all until admission to the hospital. Further history I take it was developed on further questioning after admission because of urinary tract disease and anuria. On admission his general physical

\*Joseph M. Hayman, Jr., M. D., Professor of Medicine, Western Reserve University School of Medicine, Cleveland, Ohio.

examination was essentially *negative* except for areas of raised macular lesions over the skin of the chest, abdomen, and flanks, and a slight icterus. The maculopapular lesions were regarded, I take it, as characteristic of nodular leprosy. He was catheterized on the day of admission and 5 ml of dark urine was obtained. The diagnosis of Hansen's disease was confirmed by scrapings. Further study of the biopsy of the liver was done, which was reported as showing a rather unusual picture with pleomorphism of liver cells suggesting a remarkable degree of regeneration. The biopsy findings apparently had the pathologist confused because he said they were not typical for either toxic or viral hepatitis, that there was a certain degree of arteriosclerosis, and he suggested that the patient might have hypertension; this, however, had not been brought out by his physical examination, his blood pressure being 142/68 mm Hg. Furthermore, examinations of the urine showed the constant presence of albumin and a low total volume, and blood studies showed a marked degree of nitrogen retention.

Let us look at the electrolytes. Compare the values given on 18 and 19 April with the predialysis figures on the 20th. The chlorides came down and the carbon dioxide came down too. In other words, he was a little bit worse. Well, the sum of the cations and anions have to be equal, do they not? And usually when you add sodium and potassium, which make up the bulk of the cations, together, and then add the chlorides and carbon dioxide, which are the most important of the anions, your sum of chloride and carbon dioxide is 20 meq or so less than the cations because you do not determine sulfates and phosphates, and base them on the proteins. The thing that impressed me in reading this protocol is the results of the first two days, 18 and 19 April. The sum of the cations is about 124 meq, and the sum of the anions that are given is 146. Well, when you are leaving out sulfates and phosphates you cannot possibly have enough calcium and magnesium to make up the difference, so some of those figures are bound to be wrong. That just cannot be. Now the analysis that is reported on 20 April (116 for sodium and 4.8 potassium, a total cation given us of 120.8 and 89 for total anion) is much more reasonable. The difference there could well be made up in anions by basebound proteins plus sulfates and phosphates. In other words, just because you are handed out a whole flock of laboratory figures does not necessarily mean you have to accept them. You have to scrutinize them a little carefully and see if they are reasonable.

You all know the effects of dialysis on the kidney, and I do not think we need to spend time on that. The patient responded beautifully to the first dialysis with a drop in his blood urea nitrogen to approximately one quarter of what it was, and then a gradual increase until 21 June when he was again in uremia and was dialyzed again.

As far as his leprosy goes, he had been treated at Carville with diasone. Do you know what kind of a compound diasone is? It was

introduced first for use in tuberculosis and was not very good. Then it was used in the treatment of leprosy with a fair amount of success. It falls into the group of sulfonamides. We have no information as to where this man got his leprosy, but it was some years before he got into the Army. During this acute illness and his stay in the hospital with uremia, he had a recrudescence of his leprosy lesions. That is very common in leprosy; it is spoken of as a lepra reaction and occurs both in the tuberculoid and lepromatous types. It interested me that it could recur in a man, discharged from Carville as arrested, when he gets some complicating febrile illness. Now, when this man was admitted he gave a history of having drunk some beer a few days before his febrile illness, which would raise the question of whether he had toxic nephritis, or so-called lower nephron nephrosis from some contamination of the beer he had drunk. He also gave the history of having worked for three weeks cleaning motors with a gas which he thought was carbon tetrachloride. Further investigation showed that it was not carbon tetrachloride but trichloroethylene. The question is: Was his anuria and his azotemia due either to poisoning from some chemical solvent used in cleaning these motors or to some contamination of the beer he had drunk? The picture he presented on admission of a man in reasonably good shape with a normal blood pressure, no marked oliguria, and uremia would be consistent with a tubular poisoning and could have been due to either carbon tetrachloride or some other poisoning. But there are a couple of points that may exclude that, at least tentatively.

Is there anything in the history of this man's initial illness on 5 April—with a temperature of  $101^{\circ}$  F for three days, diarrhea, abdominal cramps, and then a feeling of weakness and hiccough—that would make you think that his subsequent renal lesion was not due to poisoning by chemicals? The majority of victims of carbon tetrachloride poisoning come in afebrile. The fact that onset in this man was with fever and diarrhea that subsided in one day and then with other symptoms that subsided spontaneously made me feel that his renal lesion was probably not due to poisoning.

Now, if we go back into his history a little bit further as it is given in the protocol, we find that he had some kind of kidney disease at Carville in 1946 which apparently he got over spontaneously, and that he had a type of pain in his right side with pus and blood in his urine in 1951 for which he was given penicillin and from which he recovered.

Then in 1952 we have this acute onset of fever, transient diarrhea, hiccoughs, and rapidly developing uremia. We know the man had leprosy. It seems to me the question to be decided is whether or not his anuria and his death were due to a renal lesion which was a complication of his leprosy, or whether the renal lesion which killed him was entirely unrelated to his leprosy. Nephritis is mentioned as a complication of untreated leprosy. It is stated that many persons with

leprosy die of nephritis, but in no place could I find any description of what the renal lesion was.

It seems perfectly reasonable, however, that in a chronic infectious disease such as leprosy a certain number of people might develop amyloid and might develop renal amyloidosis and die of renal insufficiency as a result of amyloid deposits in their kidneys. If this man's leprosy was pretty well arrested—I do not think we can assume it was completely arrested or he would not have had this reaction during his hospital stay—but if we assume that it was fairly well arrested, I would not expect him to go along and develop progressive amyloid disease. Moreover, amyloid disease, as far as I know, would not account for the three bouts of kidney involvement—the one in 1946 while he was in Carville, this one in 1951 that from the description sounds like either glomerulonephritis or pyelonephritis, and finally this terminal bout. He had no hypertension, so that rules out arteriolar nephrosclerosis as a cause of chronic kidney disease. The intermittence of his attacks, the severity of them when they did occur, and the absence of hypertension I think make a chronic glomerulonephritis extremely unlikely. That leaves us with the question of a chronic recurrent pyelonephritis as a possible explanation. Certainly the second attack in 1951 is reasonably characteristic of a type of pyelonephritis, either with or without stone; and the onset of this final attack with fever and cramping abdominal pain, plus or minus diarrhea, is not inconsistent with an acute bout of pyelonephritis.

There is one thing which is lacking in the protocol which I would like very much to know. That is, I could find no mention of the specific gravity of the urine at any point. His urine volumes were zero, then 150 ml, and then there were three days of anuria. Then his urine volume increased up to a normal range of 2,000 ml or more, and for some time he apparently was holding his own because about that time his blood nitrogen was not increasing. That is consistent with tubular damage and he should have had a low specific gravity. Then for some reason or other, when he apparently was getting along pretty well, it seems that he became oliguric again and again, and ended up with what approximated anuria. It is rare in tubular damage to have a person begin to recover, get their urine volume up to 2,000 ml, and then relapse, but it does occur. Tubular damage can occur in chronic pyelonephritis, particularly if there has been any obstructive lesion of the ureters and the prostate. Tubular damage from obstruction is reversible, and recovery may occur.

There is another point in the laboratory protocol that may be worth commenting on. The urea and creatinine clearances are extremely low. As you see at the top of the column the normal urea clearance is about 80 ml per minute and the creatinine about 120, yet his creatinine clearance was down to 2.5 ml with a urine volume of 2,000 ml. Two thousand ml would be about 0.6 ml per minute, and if his clearance was only 2.5 ml it would mean that about 25 per cent or more of the volume of

glomerular filtrate appears in the urine, which is unbelievably high. Normally, you know, the urine volume is only 1 or 2 per cent of the volume of glomerular filtrate. I question the value of any clearances which are down in the range of under 10 ml. I think all you can say is that his clearances were very low.

In my opinion this man had leprosy, mostly the lepromatous type, and according to the record showed some recent exacerbation of his lesions. He also had an extensive renal lesion which may be amyloid, but I am more inclined to think it will show chronic pyelonephritis. Whether any obstructive lesion will be demonstrated or not, I do not know.

**Dr. Hayman's diagnoses:**

1. Hansen's disease, lepromatous type
2. Chronic pyelonephritis, possible amyloidosis

**PATHOLOGIC FINDINGS**

**Doctor Kellenberger:**\* Concerning the possibility that this man had trichloroethylene poisoning, I think he may well have had, considering the sick feeling which he and the other men at work experienced. Preparations of the drug used therapeutically seldom have toxic effects. However, commercial products are known to cause side effects. Hamilton<sup>1</sup> has reviewed this subject, and fatalities are encountered. Central nervous system symptoms and gastrointestinal symptoms are most commonly encountered. The difference between therapeutic and commercial products seems to be in either intrinsic impurities or dissolved hydrocarbons. Only occasionally cases of jaundice and hepatitis are reported, and these are probably reactions to impurities.

At autopsy the skin presented only a few whitish areas on the chest. Sections through these showed a leptomatous type of leprosy.

The liver was enlarged, weighing 2,500 grams, and appeared congested. Microscopically, it showed severe congestion and the small arteries showed amyloid deposits, which in retrospect represented the same findings that were erroneously interpreted as sclerosis consistent with hypertension (fig. 1).

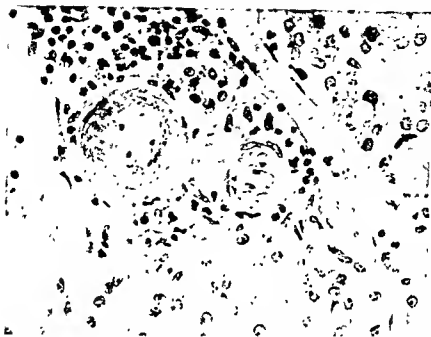
The spleen weighed 350 grams and grossly had the appearance of congestion. Microscopically it showed congestion and amyloid deposits throughout the red pulp.

The prostate contained an abscess 1.5 cm in diameter that appeared microscopically to be of an acute bacterial nature.

One testicle was normal but the other on cut section presented patchy areas of fibrosis. Microscopically, the section showed only a patchy fibrosis and atrophy without evidence of leprosy or amyloidosis. Grabstald and Swan<sup>2</sup> have recently reviewed the subject of tes-

\*Capt. Robert E. Kellenberger, MC, USA, Laboratory Service.

ticular atrophy in leprosy and believe that atrophy is the final result of acute leprous orchitis.

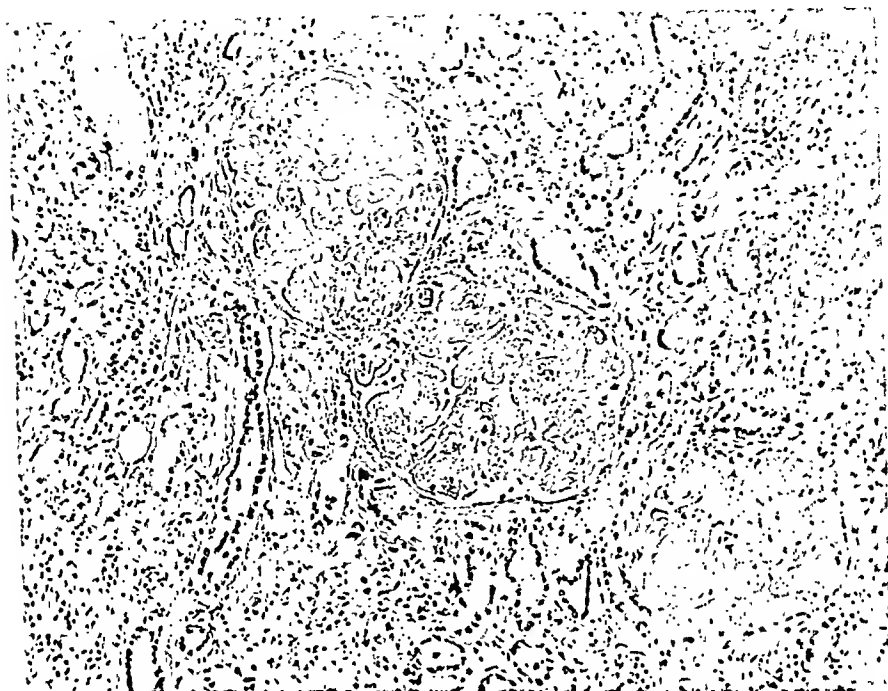


*Figure 1. Section of portal area of liver with amyloid in wall of small artery. This finding had been thought on biopsy to be evidence of hypertension. (Hematoxylin and eosin stain,  $\times 475$ )*

The kidneys each weighed 200 grams and were slightly larger than normal. The capsules stripped with ease, leaving smooth, mottled yellow-red cortices. Cut sections revealed loss of normal architecture with indistinctness of the corticomedullary borders. Throughout the cut sections there were large, poorly defined yellow-tan areas firm in consistency and waxy in appearance. Microscopic examination (fig. 2) showed almost complete replacement of the glomeruli by a homogeneous, acellular substance which took both Congo red and crystal violet stains positive for amyloid. There were numerous vessels and tubules which likewise showed amyloid deposits. The kidneys did not show inflammation.

Microscopic examination of the gastrointestinal tract disclosed amyloid deposits in the basement membranes of the mucosal glands. The thyroid presented marked interstitial amyloid deposits, as did the adrenal. The small arteries of the pancreas contained mural deposits of amyloid. There was no amyloid noted in the heart, lungs, lymph nodes, or tongue. Gingival tissue was not removed at autopsy.

Amyloidosis is a fairly common complication of leprosy. Strong<sup>3</sup> reviewed a report from the Philippine Islands in which 16 per cent



*Figure 2. Section of kidney, showing replacement of glomeruli with amyloid. (Hematoxylin and eosin stain,  $\times 105$ )*

of the patients died of nephritis that in most cases was amyloidosis rather than true inflammation.

#### **Pathologic diagnosis:**

Renal insufficiency due to amyloidosis secondary  
to leprosy

Doctor Hayman: I think this was a most interesting demonstration. The deduction made from this side of the room that sulfonamide or diasone poisoning might have been responsible for the patient's initial lesion I think was a good one, and one which I thought about for a while. But he had had his last dose of diasone somewhere back in 1947 and no symptoms until 1952. That is too long. Certainly the gross appearance of the kidney would indicate immediately that these kidneys were not the site of a chronic recurrent pyelonephritis. The histologic picture of the extensive amyloid disease I think means that he might have had a slowly progressive renal insufficiency over a long period of time, and the acute episode on 5 April probably had nothing particularly to do with his developing uremia but was simply some intercurrent infection of some kind, making diagnosis more dif-



ficult. It was an example, I think, of how long a man can go gradually developing uremia without any symptoms, because to have gotten his degree of uremia from a glomerular lesion or reduction of nephrons it must have been going on for months rather than days, as you get uremia from a tubular lesion.

I have certainly learned something and I am very much indebted to you.

Doctor Lind: I might add one last paragraph. We have a letter from Doctor R. R. Wolcott who was director at that time of the Public Health Service Hospital at Carville and he says, "Experience here does not indicate that the sulfone drugs cause kidney damage. This is not the ordinary sulfa drug, it is a sulfone. Most of the renal impairment adjudged clinically and at the autopsy table was a part of widespread amyloidosis which often complicates a long-standing leprous infection. Necrosis caused by amyloid disease is one of the leading causes of death in patients with leprosy."

#### REFERENCES

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3. Strong, R. P.: *Still's Diagnosis, Prevention and Treatment of Tropical Diseases*, 7th edition. The Blakiston Co., Philadelphia, Pa., 1944. p. 844.

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#### NO ANATOMIC CAUSE OF DEATH

Autopsies which do not reveal a plain cause for death or in which there are trivial, equivocal or even no positive findings are a source of perplexity to the pathologist who earnestly seeks to establish a real reason for death. Mild degrees of natural disease may be present as the only finding. Meticulous elimination of other possibilities is essential before death can be ascribed to such natural disease. Changes which are the result of the dying process must be fully screened and evaluated lest they be assigned a causative role. Behind every unexpected death lurk innumerable possibilities which may escape detection unless a painstaking and thorough search is made. The task may be of Gordian complexity, but it is not to be solved by intuition or a few strokes of the knife.

—LESTER ADELSON, M. D.  
in *Connecticut State Medical Journal*  
p. 733, Sept. 1954

### A MESSAGE FROM THE A. M. A.

It is found not infrequently that physicians in civilian practice are not conversant with the varied activities and services offered by the American Medical Association. What is the American Medical Association—Why does it exist—How is it organized—How does it function—How are its policy positions determined on national matters which affect the medical profession—What does it offer to physicians and the public?

Physician members of the Association should know the answers to these and similar questions concerning their organization. It is important to realize that the average practicing physician is the local representative of the American Medical Association to his patients, his friends, business associates, and his community. He is the A. M. A. to them.

A number of physicians, when called into active service with the Armed Forces, desire more information about their association and show more interest in its activities. For these reasons, this and subsequent articles to appear in the *U. S. Armed Forces Medical Journal* will be devoted to exploring the American Medical Association; its organization, function, history, and purpose.

The American Medical Association was founded on 5 May 1847, when 250 delegates representing more than 40 medical societies and 28 colleges, embracing medical institutions in 22 states and in the District of Columbia, met in the hall of the Academy of National Sciences in Philadelphia, Pa. Its first president was Dr. Nathaniel Chapman of Pennsylvania. In the past century, the American Medical Association has grown from an organization of a few thousand to a membership of more than 155,000 physicians of 1,911 component county and district medical societies and 53 constituent state and territorial medical associations. Its influence has expanded from that of a medical debating society to a world leader in medicine and a respected voice in American affairs.

The Association has as its objective the promotion of the science and art of medicine and the betterment of public health. It is a physicians' organization existing to serve the physician and the general public.

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From the Council on National Defense of the American Medical Association. The views and opinions expressed are not necessarily those of the Department of Defense.  
—Editor.

Each component county medical society, on the basis of provisions set forth in the constitution and bylaws of its respective state, selects delegates to represent that county in the House of Delegates of the state medical association. In turn, each state and territorial medical association selects one delegate per 1,000 A. M. A. members, or fraction thereof, to represent that state in the House of Delegates of the A. M. A. In addition, as provided in the bylaws, the House of Delegates includes representatives of the federal medical departments of the armed services, Veterans Administration, and the U. S. Public Health Service. The House of Delegates, composed of 192 physicians, meets semi-annually. It is the policy-making body of the Association. The House of Delegates elects seven officers and nine trustees. The Board of Trustees, the President, and the President-Elect serve as the interim governing body of the Association.

A physician may be an active, associate, service, or affiliate member of the American Medical Association. Provisions are also made for the election of honorary members.

Active membership is limited to those members of constituent associations who hold the degree of Doctor of Medicine or Bachelor of Medicine and who are active members of their constituent association with the right to vote and hold office. Service membership may be held by regular commissioned medical officers of the Army, Navy, Air Force, or U. S. Public Health Service, including reserve officers of the U. S. Public Health Service on active duty, who have been nominated by the Surgeons General of the respective services. The permanent medical officers of the Veterans Administration and the Indian Service, who have been nominated by their Chief Medical Directors, may likewise become service members. Service members retain membership as long as they are on active duty, and thereafter, if they have been retired in accordance with federal law and do not engage in active practice.

Only active and service members of the Association have the right to vote and the privilege to hold office.

Membership dues, which include a subscription to the *Journal of the American Medical Association*, are \$25 annually. Annual dues are recommended by the Board of Trustees and approved by the House of Delegates. Dues will be remitted 1 January or 1 July following the date of entrance into military service to all members temporarily in the Armed Forces and the U. S. Public Health Service, regardless of local dues exemption.

In the next and subsequent issue of the *Journal* some of the Councils, Committees, Bureaus, and Departments of the American Medical Association and their activities will be discussed.

## PROMOTIONS OF OFFICERS

The following officers of the military medical services on active duty in the Army, Navy, and Air Force have recently received *permanent* promotions to the rank indicated:

### Medical Corps

James D. Amos, Maj., USA  
 Theodore Bacharach, Maj., USA  
 Stewart L. Baker, Jr., Maj., USA  
 Robert J. Barnett, Maj., USA  
 Roberto E. Benitez, Maj., USA  
 Robert Bernstein, Maj., USA  
 Raymond W. Blohm, Jr., Maj., USA  
 Edward S. Bres, Jr., Maj., USA  
 George T. Britton, Maj., USA  
 Harry E. Burkett, Capt., USA  
 John W. Burkett, Maj., USA  
 Bruce L. Bushard, Maj., USA  
 Thaddeus W. Cap, Maj., USA  
 Joseph Castago, Maj., USA  
 George H. Chambers, Maj., USAF  
 Ralph W. Clements, Maj., USA  
 John J. Coffey, Maj., USA  
 Nicholas F. Conte, Maj., USA  
 Ray G. Cowley, Maj., USA  
 Elmer V. Dahl, Maj., USAF  
 Estill N. Deitz, Maj., USA  
 James F. Donovan, Maj., USA  
 Warren D. Eddy, Jr., Maj., USA  
 David J. Edwards, Maj., USA  
 Henry F. Fancy, Maj., USA  
 Carl A. Fischer, Maj., USA  
 Russell J. Gale, Maj., USA  
 Samuel C. Gallup, Maj., USA  
 Emil J. Genetti, Lt. Col., USA  
 Russell E. Graf, Maj., USA  
 Dell M. Gray, Maj., USA  
 James D. Green, Maj., USA  
 James L. Hansen, Maj., USA  
 Frederick G. Harris, Maj., USA  
 Harry McC. Henderson, Jr., Maj., USA  
 Euclid G. Herndon, Jr., Maj., USA  
 John A. Jenick, Maj., USA  
 Robert E. Johnston, Maj., USA  
 Augustus R. Jones, Jr., Maj., USA  
 Irvine G. Jordan, Jr., Maj., USA  
 Donald J. Joseph, Maj., USA  
 Roger A. Juel, Maj., USA  
 Allen F. Kingman, Jr., Maj., USA

Charles W. Kraul, Maj., USA  
 Frederick F. Krauskopf, Maj., USA  
 Edward A. Langdon, Maj., USA  
 Samuel Lee, Maj., USA  
 Authur E. Levy, Maj., USA  
 James E. Lewis, Maj., USA  
 Herbert L. Ley, Jr., Maj., USA  
 Charles K. Liddell, Maj., USA  
 Albert B. Lorincz, Maj., USA  
 William F. MacDonald, Maj., USA  
 David E. MacQuigg, Maj., USA  
 Sidney L. Marvin, Maj., USA  
 Stephen G. May, Maj., USA  
 Marion E. McDowell, Maj., USA  
 Worthy W. McKinney, Maj., USA  
 William H. Meroney, III, Maj., USA  
 Frank L. Miller, Maj., USA  
 James B. Moffett, Maj., USA  
 Loran E. Mott, Maj., USA  
 Irvin C. Plough, Maj., USA  
 Ralph H. Potter, Jr., Maj., USA  
 Thomas L. Robbins, Maj., USA  
 John E. Roberts, Maj., USA  
 Samuel Rodriguez, Maj., USA  
 Edmond Scavone, Maj., USA  
 Jacob F. Schirmer, Maj., USA  
 Norman McL. Scott, Jr., Maj., USA  
 Leonard H. Seitzman, Maj., USA  
 Frank J. Shannon, Jr., Maj., USA  
 John K. Spitznagel, Maj., USA  
 Murray Spotnitz, Capt., USA  
 Edwin S. Srenberg, Jr., Maj., USA  
 Donald J. Strand, Maj., USA  
 Billie G. Streete, Maj., USAF  
 Herbert P. Sube, Maj., USA  
 Richard R. Taylor, Maj., USA  
 Harry J. Umlaut, Jr., Maj., USA  
 Keith A. Walker, Maj., USA  
 Gordon T. Wannamaker, Maj., USA  
 Willard R. Warren, Maj., USA  
 Thomas J. Whelan, Jr., Maj., USA  
 Paul G. Yessler, Maj., USA  
 Douglas A. Zimmerman, Maj., USA

## Dental Corps

Charles C. Alling, Maj., USA  
 Robert B. Arbuckle, Maj., USA  
 Hector Berharr, Maj., USA  
 Leo F. Baranowski, Maj., USA  
 Robert E. Bares, Maj., USA  
 John R. Chandler, Jr., Maj., USA  
 Robert R. Clark, Maj., USA  
 Linus M. Edwards, Jr., Maj., USA  
 Reginald J. Fallis, Lt. Col., USA  
 Willfred H. Gladue, Maj., USA  
 Arthur B. Harris, Maj., USAF  
 August R. Huberwald, Lt. Col., USAF  
 Leonard S. Johnston, Maj., USAF  
 Marvin M. Kuhn, Maj., USA  
 Lloyd Lister, Maj., USA  
 Peter M. Margetts, Maj., USA  
 Howard W. McCall, Maj., USA

Ashton A. Moody, Maj., USA  
 Richard A. Moll, Maj., USA  
 Theodore J. Post, Col., USA  
 William M. Ream, Lt. Col., USA  
 Jack Roper, Maj., USA  
 Hosea F. Sawyer, Maj., USA  
 Francis W. Shaffer, Maj., USA  
 Ralph B. Sneed, Maj., USA  
 Kenneth L. Stewart, Capt., USAF  
 William C. Strong, Maj., USA  
 Thomas W. Taylor, Maj., USA  
 Henry C. Thompson, Maj., USA  
 James T. Thompson, Maj., USA  
 George I. Uoham, Capt., USA  
 Ross W. Vatten, Capt., USA  
 George L. Vian, Jr., Maj., USA  
 Justin S. Zack, Maj., USA

## Veterinary Corps

Robert W. Bailey, Capt., USAF  
 Don L. Deane, Lt. Col., USA  
 William H. Dieterich, Maj., USA  
 William S. Gochenour, Jr., Maj., USA  
 Don L. Mace, Lt. Col., USA

Stewart J. McConnell, Capt., USA  
 Thomas G. Murnane, Jr., Capt., USA  
 Lloyd J. Neumet, Maj., USAF  
 James M. Shuler, Capt., USAF  
 James B. Young, Capt., USA

## Medical Service Corps

Lee A. Ahz, Maj., USA  
 Lawrence S. Albrecht, Maj., USA  
 Eugene S. Alexander, Maj., USA  
 Ralph D. Arnold, Maj., USA  
 Eugene M. Baker, Capt., USA  
 Herbert C. Barnett, Maj., USA  
 Leonard C. Barney, Maj., USA  
 Leo E. Beasde, Lt. Col., USA  
 Richard E. Bentley, Capt., USA  
 Roger R. Besaon, Capt., USA  
 Wilbert A. Black, Capt., USAF  
 Lyman Blakesley, Capt., USA  
 Jack T. Blue, Capt., USA  
 William V. Breyfogle, Maj., USA  
 Arthur E. Burt, Maj., USA  
 Byron W. Brown, Maj., USA  
 John A. Brown, Maj., USA  
 Roy A. Bryan, Maj., USA  
 Dee C. Buchanan, Maj., USA  
 Philip J. Buckler, Maj., USA  
 Jesse N. Budet, Maj., USA  
 Robert M. Bynum, Capt., USA  
 Thomas P. Catto, Maj., USA  
 Ernest D. Chadbourne, Capt., USA  
 William J. Clegg, Jr., Maj., USA  
 Milton Cohen, Capt., USA  
 Renne C. Coleman, Jr., Capt., USA  
 George T. Coller, Maj., USA  
 Andrew J. Colyer, Maj., USA  
 George F. Conrad, Maj., USA

Charles J. Cornell, Maj., USA  
 Thomas A. Costello, Capt., USA  
 Charles J. Cowgill, Maj., USA  
 Ardia T. Cox, Lt. Col., USA  
 George H. Crampton, Capt., USA  
 Raymond J. Creamer, Maj., USA  
 John C. Cremen, Capt., USA  
 James D. Davenport, Jr., Capt., USA  
 Louis F. Davidson, Capt., USA  
 George J. DeGraff, Maj., USA  
 Richard W. Dempsey, Maj., USA  
 Francis O. Desautels, Maj., USA  
 John P. Devlin, Capt., USA  
 Joseph D. Dowless, Jr., Maj., USA  
 Jack W. Downing, Capt., USA  
 Sam A. Edwards, Maj., USA  
 Thomas R. Edwards, Maj., USA  
 Stanley W. Egenze, Jr., Maj., USA  
 Earl D. Ess, Capt., USA  
 Findlay F. Flatter, Maj., USA  
 James R. Francis, Maj., USA  
 William K. Fugitt, Maj., USA  
 Howard J. Funston, Maj., USA  
 Sidney Games, Maj., USA  
 Harry L. Gans, Maj., USA  
 Walter H. Gelby, Maj., USA  
 Tilmot L. Gibson, Maj., USA  
 Harold S. Gillespie, Capt., USA  
 Matthew Gralick, Capt., USA  
 Frank D. Godwin, Maj., USA

## Medical Service Corps—Continued

Otto S. Good, Maj., USA	Charles E. Patch, Jr., Capt., USA
Raymond E. Graham, Capt., USA	Albert L. Paul, Capt., USA
John T. Gray, Maj., USA	Michael J. Pavlo, Capt., USA
Richard S. Greer, Maj., USA	William G. Pearson, 1st Lt., USA
James D. Grindell, Maj., USA	Theodore S. Pendrak, Capt., USA
George L. Grow, Maj., USA	Marion J. Pitt, Maj., USA
John M. Hallahan, Maj., USA	Sam A. Plemmons, Maj., USA
Bernard W. Hammaker, Maj., USA	John A. Postle, Capt., USA
Alan Marcus, Capt., USA	Dudley F. Powell, Maj., USAF
Cecil H. Hayes, Capt., USA	Harry C. Powell, Maj., USA
William H. Hayes, Capt., USA	Winston K. Powell, Capt., USA
Harold E. Hill, Maj., USA	William J. Prescott, Capt., USA
Harold C. Hodgkins, Capt., USAF	Felix G. Rajewski, Maj., USA
John W. Holt, Maj., USA	George B. Randolph, Jr., 1st Lt., USA
Claude L. Hooker, Maj., USA	Ralph J. Richards, Jr., Maj., USA
Kenneth G. Howard, Maj., USA	Hasty W. Riddle, Maj., USA
Melville C. Hutchinson, Maj., USA	R. V. Rivenbark, Maj., USA
Maurice W. Hylden, Maj., USA	Walter F. Robbins, Maj., USA
Denn M. Jewell, Maj., USA	Henry J. Rockstroh, Maj., USA
Wayne H. Jonson, Maj., USA	James T. Saling, Maj., USA
Daniel R. Kifer, Maj., USA	Otto H. Sandman, Jr., Maj., USA
Frank Killian, Jr., Lt. Col., USAF	Norman R. Schlicher, Maj., USA
Carl J. Koehn, Lt. Col., USA	Howard R. Scroggs, Maj., USA
Matthew J. Kownlsky, Maj., USA	Keith O. Shafer, Capt., USA
William O. Krause, Maj., USA	Albert L. Schiavone, 1st Lt., USA
Lester M. Kyke, 1st Lt., USA	James H. Snelling, Maj., USA
Philip L. La Manche, Maj., USA	Albert H. Snider, Maj., USA
Harold P. Larson, Maj., USA	John S. Snyder, Capt., USA
Howard C. Leifheit, Capt., USA	William W. Southard, Jr., Maj., USA
Claude R. Lenn, Maj., USA	Thomas B. Stewart, Maj., USA
William H. Lindsey, Capt., USA	Harold Stone, Capt., USA
Vernon H. Loisel, Maj., USA	Robert A. Stone, Capt., USA
Henry E. Lord, Capt., USA	Joseph J. Strnad, Maj., USA
Francis T. Lynch, Maj., USA	Ross F. Swall, Maj., USA
Dale R. Maher, Maj., USA	Hughie C. Thomas, Maj., USA
Edward Marks, Maj., USA	Jerry V. Thompson, Maj., USA
Edward J. Martin, Maj., USA	Willard E. Thompson, Maj., USA
Marshall A. Mason, Jr., Capt., USA	Robert Traub, Maj., USA
Charles F. McAdeer, Jr., Capt., USA	John H. Trenholm, Lt. Col., USA
James E. McArthur, Capt., USA	Elon B. Tucker, Lt. Col., USA
Gordon F. McCleary, Lt. Col., USA	Floyd E. Van Sickle, Jr., Maj., USA
Norman G. Miller, 1st Lt., USA	Foster Watts, Maj., USA
Wayne J. Moe, Capt., USA	William M. Wegner, Capt., USA
James E. Moore, Capt., USA	Earl Weiss, Capt., USAF
William S. Mullins, Capt., USA	Lyle H. Wharton, Capt., USA
Paul W. Murphy, Maj., USA	Charles L. Wirtliff, Capt., USA
Detold K. Nashold, Maj., USA	Charles R. Wolf, Jr., Maj., USA
Guy C. Nicholson, Maj., USAF	Bertram S. Wright, Maj., USA
Erroll E. Pace, Jr., Capt., USA	Warren W. Zielonka, 1st Lt., USA
Arthur T. Park, Capt., USAF	Joseph C. Ziesenheim, Capt., USA

## Nurse Corps

Helen M. Abramowska, Lt. Col., USA	Helen L. Black, Capt., USA
Carmie E. Barnett, Lt. Col., USA	Beverly E. Boehman, Capt., USA
Mary C. Bortman, Lt. Col., USA	Mayme V. Campbell, Capt., USA
Olga M. Branson, Capt., USA	June L. Chambers, Capt., USA

## Nurse Corps—Continued

Anastasia A. Chaponis, Capt., USA  
 Laverne M. Collaro, 1st Lt., USAF  
 Jeanette M. Confort, Capt., USA  
 Mabel H. Corbin, Capt., USA  
 Geraldine V. Coxwell, Capt., USA  
 Jean M. Dodds, Capt., USA  
 Mary L. Donovan, Capt., USA  
 Maxine Douglas, Capt., USA  
 Mildred Duncan, Capt., USA  
 Lillian Dunlap, Capt., USA  
 Winifred L. Edman, Capt., USA  
 Berniece I. Fairchild, Capt., USA  
 Vivian Farland, 1st Lt., USA  
 Catherine E. Fuller, 1st Lt., USA  
 Emma A. Galgano, Capt., USA  
 Eleanor R. Gallagher, Capt., USA  
 Eleanor A. Gaynor, Capt., USA  
 Betty M. Grelsdeth, 1st Lt., USA  
 Shirley M. Gilson, Capt., USA  
 Miriam K. Ginsberg, 1st Lt., USA  
 Margaret M. Griffith, Capt., USA  
 Ida L. Haegeler, Capt., USA  
 Julia E. Hambrick, Capt., USA  
 Aloha B. N. Hammerly, Capt., USA  
 Helen M. Hill, Capt., USA  
 Louise Hill, 1st Lt., USA  
 Mary I. Hogan, Maj., USA  
 Lucy E. Jacobson, Lt. Col., USA  
 Mary A. Jones, Capt., USA

Lois King, Capt., USA  
 Grace E. Koow, Capt., USA  
 Ruth L. Koontz, Capt., USA  
 Lena S. Kropski, Capt., USA  
 Ethel A. Lamansky, Lt. Col., USA  
 Frances I. Lay, Lt. Col., USAF  
 Lillian G. Link, Capt., USA  
 Betty L. Madden, Capt., USA  
 Mary E. Mahar, Capt., USA  
 Petrina M. Mead, Capt., USA  
 Esther M. Momrow, 1st Lt., USAF  
 Helen E. Moore, Capt., USA  
 Daisy E. Moore, Capt., USA  
 Marie L. Morris, Capt., USA  
 Louise L. Mortensen, Capt., USA  
 Nora E. Murphy, Capt., USA  
 Gladys O. Newby, Capt., USA  
 Barbara J. Nichols, Capt., USA  
 Florence L. Petty, Capt., USA  
 Irene R. Z. Prshak, Capt., USA  
 Joan M. Polidora, 1st Lt., USA  
 Ida G. Price, Maj., USA  
 Kathleen E. Quigley, Capt., USA  
 Rosa J. Ramirez, Capt., USA  
 Mildred F. Schooley, 1st Lt., USAF  
 Mineva A. Senn, Capt., USA  
 Margaret M. Shea, Capt., USA  
 Mattie L. Smith, Capt., USA  
 Elizabeth J. Starkey, 1st Lt., USA

## DEATHS

COREY, Giles Patterson, Lieutenant (MC) USNR, New Bern, N. C.; U. S. S. *Antietam* graduated in 1951 from the Bowman Gray School of Medicine of Wake Forest College, Winston-Salem, N. C., appointed a Lieutenant (jg) 31 August 1953; ordered to active duty 30 October 1953, died 23 October 1955, age 30, at the Duke Hospital, Durham, N. C., of multiple myeloma.

HARRIS, Louis Marshall, Captain (MC) USN, Newport, R. I.; U. S. Naval Hospital, Newport; graduated in 1931 from the University of Arkansas School of Medicine, Little Rock, Ark.; commissioned a Lieutenant (jg) in 1931; died 11 November 1955, age 54, at the Newport Naval Hospital, of coronary occlusion.

OWNBY, Thomas "J," Commander (DC) USN, Brooklyn, N. Y.; U. S. S. *Wiscasset*, graduated in 1931 from the Kansas City-Western Dental College, Kansas City, Mo.; appointed a Lieutenant (jg) in the United States Naval Reserve 30 April 1942; ordered to active duty 4 August 1942; released to inactive duty in November 1945; commissioned a Lieutenant Commander in the Regular Navy 10 October 1948; died 18 October 1955, age 47, at his home in Brooklyn, N. Y., of coronary thrombosis.

VARELIA, Helen Louise, Ensign (MSC) USNR, Los Angeles, Calif., U. S. Naval Hospital, San Diego, Calif.; graduated in 1951 from the Fresno State College; appointed an Ensign and ordered to active duty 11 January 1955; died 3 November 1955, age 26, at the San Diego Naval Hospital, of a subarachnoid hemorrhage.

## Reviews of Recent Books

PSYCHIATRY FOR THE FAMILY PHYSICIAN, by C. Knight Aldrich, M. D. 276 pages; illustrated. The Blakiston Div., McGraw-Hill Book Co., Inc., New York, N. Y., 1955. Price \$5.75.

This is a real gem and by far the most worthwhile of the many volumes available which explain psychiatry and its principles to the non-specialist. The scope of the book is comprehensive, its style admirably lucid, and the absence of the usual psychiatric jargon is most commendable. The author never commits the fault of being condescending or patronizing to the family physician, but instead presents his subject in the most understandable and logical manner, ending each chapter with a brief summary.

By far the best chapter is the one dealing with treatment, in which is described actual treatment methods that the family physician can use. Essentially these are brief psychotherapeutic methods, using the technics of psychologic support which the author reasonably feels is applicable to a series of treatment periods averaging only 20 minutes each.

This admirable volume is highly recommended not only for "family physicians" but for medical students as well. It is a true teaching text, and even psychiatric residents beginning training would benefit from reading it, if only to see how logically and simply the subject can be presented.—JOHN F. MC MULLIN, *Capt. (MC) USN*

ANNALS OF THE NEW YORK ACADEMY OF SCIENCES, Volume 63, Arr. 1, Pages 1-144, July 15, 1955, edited by Roy Waldo Miner. "The Regulation of Hunger and Appetite." Conference Chairman and Consulting Editor: Franklin Hollander. 143 pages; illustrated. The New York Academy of Sciences, New York, N. Y., 1955. Price \$3.

In November 1954 a conference on the regulation of hunger and appetite was held at the New York Academy of Sciences. Thirteen papers dealing with regulating mechanisms and clinical aspects were presented. These articles constitute one of the best sources of our scientific knowledge of hunger and obesity to be found anywhere. Free from the emotional bonds that grip many papers on the subject, reports of experiments and clinical observations are presented by several of the most active investigators in the field.

Some especially stimulating reports deal with a "night-eating syndrome," with special food cravings and aversions, and with a "lipostatic" hypothesis. The theme, however, is the physiologic, biochemical, and pharmacologic aspects of hunger and appetite and, therefore, is of particular interest to both clinicians and research workers. This book can be highly recommended.—S. O. WAIFE, *Lt. Comdr. (MC) USNR*



ADVANCES IN INTERNAL MEDICINE, Volume VII, edited by William Dock, M. D. and L. Snapper, M. D. 311 pages; illustrated. The Year Book Publishers, Inc., Chicago, Ill., 1955. Price \$8.50.

This volume contains eight articles of current interest. The subjects covered are renal lithiasis, hepatic coma, pathophysiology of the pancreas, serum mucoproteins, physiology of clinical disorders of the adrenal gland, diseases of the pericardium, nephrotic syndrome, and applied physiology.

The physician can keep well informed of current advances in these reviews. Each subject has an extensive bibliography, and the subject and author indexes are excellent. For the physician desiring the latest information and bibliography on any of the above subjects, the book is recommended.

The reviews are of little practical value in regard to an understanding of their application to clinical medicine and are not intended for the general practitioner. The undergraduate student or the physician desiring the latest information on these subjects will find this book very valuable. The extensive bibliography for references alone justifies the inclusion of the book in the library of the internist.

—WALTON M. EDWARDS, Lt. Col., MC, USA

NEW AND NONOFFICIAL REMEDIES, 1955. The Council on Pharmacy and Chemistry, American Medical Association. 653 pages; illustrated. J. B. Lippincott Co., Philadelphia, Pa. 1955. Price \$3.35.

The Council on Pharmacy and Chemistry of the American Medical Association has, as one of its primary goals, the encouragement of the rational practice of therapeutics. To aid in the attainment of this goal the Council annually publishes statements of drug actions and monographs on newer drugs in *New and Nonofficial Remedies*, and this book fills a need not met by the official drug control bodies.

The drug action portion of the N. N. R. for 1955 is excellently written. In contrast, the monographed articles seem to be neither *new* nor *nonofficial*. As an example, of the 15 articles accepted under the heading "Agents Used in Allergy," 11 have been included in the United States Pharmacopeia and one in the National Formulary. Under the section dealing with sympathomimetic substances are found 12 official substances and only 8 nonofficial ones.

There seem to be several noteworthy omissions of articles which are *new* and *nonofficial* from this edition. Under "Motion Sickness Remedies" N. N. R. lists one agent—dimenhydrinate USP—while a current review article on the subject cites equal or superior effectiveness for at least two other compounds. Under "Antidotes for Heavy Metal Poisoning," the 1955 N. N. R. includes only dimercaprol USP; and omits mention of the chelating agents which are admittedly effective in heavy metal poisoning. These omissions seem to point to the need for more emphasis on evaluation of new remedies by the Council.

In spite of omission of some really *new* drugs and a tendency to retain products which have become official and well known, this publication remains a reliable source book from which the medical profession may obtain a conservative, accurate statement of modern concepts of drug action, along with monographs on fairly new drugs.

—ROY L. MUNDY, *Capt.*, MSC, USA

THE PREVENTION OF DISEASE IN EVERYDAY PRACTICE, by *Isadore Givner*, M. D., F. A. C. S. and *Maurice Bruger*, M. Sc., M. D., C. M., F. A. C. P. 964 pages; illustrated. The C. V. Mosby Co., St. Louis, Mo., 1955. Price \$20.

Most diseases, particularly those of an infectious nature, with the discovery of their cause, have been brought under public health control. Many other diseases, however, such as diabetes, arthritis, cardiovascular and mental disorders, and carcinoma, still are blocking progress in preventive medicine. Any further progress in such conditions will depend more and more on the practicing physician who must be concerned not only with the prevention of these diseases but also with the prevention of their complications and the complications that might arise from operative procedures which patients with these diseases frequently require.

This volume is concerned with the present-day trend on the preventive aspects of such diseases and their complications that are observed in the everyday practice of medicine. It is written by more than 40 contributing practicing physicians, each one a specialist in a recognized field of medicine, including dentistry.

Suitable references are given at the end of each of the 37 chapters. The index, printing, and binding are excellent.

Today, with the line of distinction between preventive medicine and medical practice being erased, this book will serve a useful purpose to every practicing physician. —PATRICK I. McSHANE, *Col.*, MC, USA

THE HUMAN MACHINE, Biological Science for the Armed Services, by *Charles W. Shilling*, Captain (MC) USN. 292 pages; illustrated. United States Naval Institute, Annapolis, Md., 1955. Price \$5.

The military commander who understands the physical, emotional, and intellectual complexities of his men is a rarity. Knowing full well the limited knowledge of the human organism possessed by the majority of officers holding or aspiring to positions of command, the author has provided a valuable and timely volume for their education and guidance. It is equally applicable in civilian life where "the human machine" is the key to successful progress in industry, science, and the arts.

The three parts of this readable book contain a total of 20 chapters on the human machine's construction and operation (anatomy and physiology), preventive maintenance and repair, and use in war. The style is pleasing and the context is geared to the experiences and understanding of the lay reader. Although influenced by Dr. Shilling's long

career in the Navy, full consideration is given to all aspects of the stresses of military life. Specialized sections on oral health, first aid, marine biology, and aviation medicine have been prepared by his colleagues, particularly those at the United States Naval Academy. In conclusion, the author stoutly defends the staff medical officer: "The commanding officer is not only a more efficient, but a bigger and better naval officer if he listens to professional advice in the areas in which he obviously cannot be competent."

This book is attractively illustrated and handsomely published. It has an adequate index and a bibliography of appropriate references. The foreword is by Vice-Admiral C. Turner Joy, USN.

—ROBERT J. BENFORD, Col, USAF (MC)

**SURGICAL PHYSIOLOGY OF THE ADRENAL CORTEX**, by James D. Hardy, M. S. (Chem.), M. D., F. A. C. S. 191 pages; illustrated. Charles C Thomas, Publisher, Springfield, Ill., 1955. Price \$5.75.

This monograph considers the physiology, experimental data, and management as well as indications for use of ACTH and cortisone in various disease states. Two chapters are particularly valuable for the practical surgeon who is seeking ready information. While of interest, the remaining chapters are not so essential, as most of the information is repeated briefly in the last chapter. The format is somewhat cumbersome and occasionally distracting in that references are individually mentioned by name throughout the text, thus breaking the chain of thought. The frequent repetition of 274 references is an enormous obstacle in such a short monograph. However, this does provide a ready bibliography for adrenocortical study.

The monograph offers an encompassing review of the adrenal cortex and would be of value to house officers in surgery who are looking for efficient, practical information on this subject.

—VICTOR C. STRATTON, Comdr (MC) USN

**CARDIOLOGY NOTEBOOK For Preliminary Instruction in Medical Curricula**. Columbia University College of Physicians and Surgeons. 97 pages; illustrated. Grune & Stratton, Inc., New York, N. Y., 1955. Price \$2.50.

This unique book consists mostly of illustrations with a minimal amount of words. It is designed for medical students in their first years of clinical medicine and brings together in one small volume excellent illustrations of normal and common abnormal cardiac roentgenograms, electrocardiograms, and phonocardiograms. The posteroanterior, the left anterior oblique, and the right anterior oblique fluoroscopic views of the normal heart are illustrated. Abnormal cardiac conditions best observed in these various positions are described and shown.

Normal values of pulmonary function and cardiac hemodynamics are given, as well as the nomenclature for making a complete cardiac diagnosis including functional capacity and therapeutic classification.

All in all, this is a worthwhile book for the medical student. Interns and residents will also find it useful and worth the price. An added feature is that on almost every other page there is space for making additional notes.

The authors are to be commended for including so much material so completely in such a simplified way that it can be reviewed in an hour or so, depending on the desire of the reader.

—PATRICK I. McSHANE, Col., MC, USA

IONOGRAPHY, Electrophoresis in Stabilized Media, by *Hugh J. McDonald*, D. Sc. In collaboration with *Robert J. Lappe*, M. S., *Edward P. Marbach*, Ph. D., *Robert H. Spitzer*, M. S., and *Matthew C. Urbin*, Ph. D. 268 pages; illustrated. Year Book Publishers, Inc., Chicago, Ill., 1955. Price \$6.50.

The field discussed in this volume is one in which the current rate of expansion far exceeds the amount of information readily available to a person who wishes to employ the technics involved. The author and his collaborators have produced a text that can be readily used by beginners in the field. They describe in some detail the various types of apparatus for this method of chromatography, and discuss the methods used in all phases of ionography. The importance of mobility determinations is stressed and the methods to carry out this part of the analysis are given in extra detail. The relation between mobilities in stabilized and nonstabilized media is clearly defined and developed.

Half of the book concerns the applications of this method to biochemistry. Passing reference is given to other applications. These chapters form a good review and beginning point for the investigator who would like to use these technics. The references are more than adequate and cover the field well.—IRVING GRAY, Lt. Col., MSC, USA

AN OUTLINE OF PRESENT DAY THORACIC SURGERY, by *Robert I. Carlson*, M. D. 158 pages. Educational Publishers, Inc., St. Louis, Mo., 1954. Price \$4.25.

In a 158-page brochure the author has prepared an outline of thoracic surgery primarily for medical students, interns, and residents. Its purpose is to serve as a starting point for those interested in thoracic surgery. The discussion given in outline form of necessity is brief but well presented. Several notations are made to different concepts in therapy which afford the reader a ready index for further study. The chapter on cardiac surgery is not as complete as the others that deal with the remainder of thoracic surgical topics.

The pages of the outline are bound by plastic rings which hinder the turning of the pages and frequent use will no doubt loosen many of the pages. There are no illustrations, graphs, or diagrams. The index is well organized, and the bibliography contains many references.

—JOSEPH M. HANNER, Capt. (MC) USN

LABORATORY IDENTIFICATION OF PATHOGENIC FUNGI SIMPLIFIED, by Elizabeth L. Hazen, Ph. D., and Frank Curtis Reed, 108 pages; illustrated. Charles C Thomas, Publisher, Springfield, Ill., 1955. Price \$5.50.

Considering the brevity of this monograph (108 pages, 100 photographs), much useful information is presented. The essential features of the most common dermatophytes and systemic fungi encountered in North America are presented in tabular form. The photomicrographs of the diagnostic structures and tissue phases are typical and clearly correlated to textual descriptions. The fungus diseases are discussed briefly from a clinical point of view and reference is made very briefly to the use of laboratory animals and to the specimens ordinarily submitted for examination. In the last few pages, there is appended an excellent group of selected references and a compilation of formulas of the most commonly used media with, however, no guide as to their intended use.

The somewhat fragmentary information presented regarding procedures and techniques, variation and growth characteristics of the pathogens, and the use of black and white photographs (in the case of the giant colonies) limits the utility of this manual to the trained worker. In order to use this monograph in a practical manner, the beginner must possess a knowledge of the relative distribution, growth characteristics, variation, and morphology of the common saprophytic forms (about which no reference has been made herein) and some knowledge of the necessary precautions and methods of collecting and treating specimens, as well as a knowledge of techniques and procedures unique to mycology.

In spite of the above limitations, a definite contribution has been made in a rather complex field. To the bacteriologist, dismayed by the present state of mycologic diagnosis and possessing the requisite knowledge set forth above, the task of identifying pathogenic fungi should become less arduous and confusing with the aid of this monograph. It will also serve admirably as an aid in teaching the elements of mycologic diagnosis to beginners when used in conjunction with the display of actual giant colonies and presentation of adequate technical descriptions.—GRANVILLE M. MOORE, Lt. Comdr. (MSC) USNR.

CLINICAL TOXICOLOGY, by Clinton H. Thienes, M. D., Ph. D., and Thomas J. Haley, Ph. D. 3d edition. 457 pages; illustrated. Lea & Febiger, Philadelphia, Pa., 1955. Price \$6.50.

The format and style of this third edition of a well-known textbook remain the same as in previous editions, but there is a moderate expansion to incorporate information on recently introduced chemicals such as the anticholinesterase insecticides and defoliant compounds. Newer improved methods of analysis for the qualitative and quantitative presence of various chemicals have been substituted, and methods for the protection of additional substances such as the synthetic estrogens and antithyroid compounds have been added.

In a brief but adequate manner the chemistry, pharmacology, pathology, symptomatology, and treatment of patients with poisoning due to common substances are discussed. Poisons are grouped according to their major mechanism of action. Where they act strongly on more than one physiologic system, they are mentioned under various appropriate headings. Closely related poisons are discussed, however, under a single heading. For the general practitioner, Chapter 29, "An Outline of Symptom Diagnosis," is of value in the differential diagnosis of various types of poisoning. The last third of the book is devoted to analytic methods for the qualitative and quantitative detection of the various poisons. The original references for most of these methods are stated, but the symptoms and treatment are covered without any bibliography other than a mention in the preface of other books of toxicology. A moderate number of pertinent illustrations accompany the methods for chemical analysis.

This book contains a large amount of information on toxicology condensed into a relatively small and useful manual. It is highly recommended as a text in a classroom or as a guide to the clinician.

—MILWARD W. BAYLISS, Col., MC, USA

MANAGEMENT OF DISORDERS OF THE AUTONOMIC NERVOUS SYSTEM, by Louis T. Palumbo, M. D. 186 pages; illustrated. The Year Book Publishers, Inc., Chicago, Ill., 1955. Price \$5.

In the space of less than 150 pages of text the author has attempted to cover the broad field relating to the autonomic nervous system. When one appreciates the vast anatomic, physiologic, and clinical implications of the autonomic nerves, controlling to a large extent the vitally important function of homeostasis as they do, it is at once evident this publication can but briefly touch upon the various facets of the subject.

The pattern of the book essentially follows that of other well-known works on the subject. In none of these three chapters devoted to anatomy, physiology, and pharmacology is there any new material. In the chapters covering the application of the several forms of therapy for disorders of the autonomic nervous system one gets the impression of overenthusiasm for anticipated results. There is no description of surgical technics; however, reference is made to failures to attain anticipated results because of incomplete ablation. The 172 references cover a liberal range of relatively recent literature relating to the autonomic nervous system, and the index is entirely adequate.

This volume is one of the general practice manuals and as such may perhaps serve a usual purpose, though one should not be misled into expecting miracles from the use of many of the medical or surgical procedures recommended. It is definitely not a work of reference for the specialist and does not represent any original investigation.

—EVERETT H. DICKINSON, Capt. (MC) USN

**EXPERIENCING THE PATIENT'S DAY, A Manual for Psychiatric Hospital Personnel**, by *Robert W. Hyde, M. D.* 214 pages. G. P. Putnam's Sons, New York, N. Y., 1955. Price \$2.20.

This book, written with the collaboration of the attendants of the Boston Psychopathic Hospital, is exactly what its subtitle says. It is the outcome of a series of group discussions that the author had on a continuing basis with his attendants, to increase their potential skills in working with patients. "The education of the attendant is primarily the process of observant participation with patients, where together they may understand the essential elements of human experience."

Various sections are entitled "The 24 Hour Day," "Examination of the Patient," "Treatment," "Symptoms and Diagnosis," "Orientation," "Problems," and "Ward Problems." Each section has an introductory note describing the subject, and then reports the interchange of thoughts and feelings of the attendants, who actually spend most time with the patients. The varying attitudes toward particular problems, toward patient behavior, et cetera, and the way they impinge on the therapeutic program, are clearly delineated.

A similar program on a much smaller scale has been instituted—with encouraging results—on the several services where this reviewer has been chief. It is therefore recommended that copies of this excellent manual be available at all military installations where neuropsychiatric staff personnel are in training.

It is regretted that the binding is of paper, because this book will be much in use. —*FELIX H. OCKO, Capt. (MC) USN*

**SADDLE BLOCK ANESTHESIA**, by *Ray T. Parnley, M. D.* 59 pages; illustrated. Charles C Thomas, Publisher, Springfield, Ill., 1955. Price \$2.50.

Although the material presented in this short monograph is highly technical, it is written in a clear, logical style. The presentation should appeal to both the general practitioner and the obstetrician, who are called upon to perform spinal analgesia, and should be instructive to residents in anesthesia.

The anesthesiologist will find nothing new in this monograph. However, the general principles of spinal analgesia are so clearly described that even the specialist can profit from such a well-organized review. There is no doubt that the author has a wide experience with the spinal technic. The rules he sets down for successful spinal analgesia can come only from a great deal of personal experience. The unpopularity of spinal analgesia in some localities is discussed. The fear of this technic apparently lies in the medicolegal implications. There is one small complaint. The references to the figures are confusing.

—*DANIEL M. PINO, Comdr. (MC) USN*

**SYSTEMIC LUPUS ERYTHEMATOSUS:** Review of the Literature and Clinical Analysis of 138 Cases, by A. McGehee Harvey, M. D., Lawrence E. Shulman, M. D., Philip A. Tumulty, M. D., C. Lockard Conley, M. D., and Edyth H. Schoenrich, M. D. 437 pages; illustrated. The Williams & Wilkins Co., Baltimore, Md., 1955. Price \$3.

This book is a reprint of an article that appeared in the December 1954 issue of *Medicine*, and constitutes an excellent review of the clinical aspects of systemic lupus erythematosus. It is an analysis of 138 cases from the Department of Medicine of the Johns Hopkins University and Hospital and a review of the literature on this topic. The protean manifestations of the disease are stressed. The L. E. cell phenomenon is adequately discussed as well as the chronic biologic false positive serologic tests for syphilis. Of great value to the internists and rheumatologists are the 29 pages devoted to hormone therapy, outlining the specific effects of such therapy on the specific manifestations of the disease. One of the most valuable features of the book are the illustrative patients that have been carefully selected to show the protracted course of the disease, the varied symptomatology, the diagnostic problems they initially present, and the effects of hormonal therapy on the various systemic manifestations.

This book is the most complete treatise in print today on systemic lupus erythematosus. An excellent bibliography is appended, the illustrations are excellent, and the many tables and diagrams are clearly and concisely presented.

Those interested in connective tissue disease will find the book a valuable addition to their library and one they will constantly use.

—LEON J. NUMAINVILLE, Col., MC, USA

**J. A. M. A. Clinical Abstracts of Diagnosis and Treatment.** Published with the Approval of the Board of Trustees, American Medical Association. 627 pages. Intercontinental Medical Book Corp., with Grune & Stratton, Inc., New York, N. Y., 1955. Price \$5.50.

This is the first of an annual series of clinical abstracts culled from 1,200 periodicals, selected by Nash D. Fabricant, M. D., Editorial Associate, Journal of the American Medical Association.

The abstracts have been grouped under 14 headings: Internal Medicine, Surgery, Neurology and Psychiatry, Pediatrics, Gynecology and Obstetrics, Dermatology, Urology, Ophthalmology, Otolaryngology, Therapeutics, Pathology, Radiology, Anesthesia, and Physiology. The index is unique in that each of the above-named sections is alphabetized individually rather than collectively.

The grouping of these abstracts, while of limited value in diagnosis and treatment, permits a quick determination as to the desirability of studying the original articles. Likewise, the physician preparing a paper for presentation to a medical society or journal has a ready reference, easily located, due to the grouping of the various subjects.

—ARTHUR E. WHITE, Col., MC, USA



**PROGRESS IN NEUROLOGY AND PSYCHIATRY**, An Annual Review, Volume X. Edited by E. A. Spiegel, M. D., 645 pages. Grune & Stratton, Inc., New York, N. Y., 1955. Price \$10.

The purpose of this series as stated in the preface to this 10th annual volume is "... they bring the reader up to date regarding recent developments in the fields of neurology and psychiatry, (and) their basic foundations and clinical ramifications . . . ." It is believed this purpose has been achieved in noteworthy fashion.

The current volume makes its usual significant contribution to our integrated knowledge of psychiatry and neurology. It is essentially a synthesizing effort in which the essential elements of the many papers reviewed are presented appropriately in relationship to each other and in relationship to the logical subdivisions of the already known.

The table of contents is logically and usefully devised; references are complete; and the volume is well indexed. The presentation is in narrative form, readable, and particularly valuable because of its intrinsic integrating and synthesizing qualities.

This, as are the previous nine volumes, is a record of history in the making, and should be read by all in the field who wish to keep their knowledge current. — DONALD B. PETERSON, Col., MC, USA

**BRITISH MEDICAL BULLETIN**, Blood Coagulation and Thrombosis, Volume XI, Number 1. 82 pages; illustrated. Published by Medical Department, The British Council, London, April 1955. Distributed by Oxford University Press, New York, N. Y., Price \$2.75.

This book is the latest in this important series of reviews. After the heavy dose of clotting-in-the-test tube which the medical world has endured these 20 years, a trend toward a wider view of hemostatic disease is long overdue and more than welcome. The coagulationists have done well in these years, uncovering a dozen clotting factors and two new hemorrhagic diseases for each factor. We have grown to think of hemostasis and coagulation as equivalents with the flaws of one inevitably reflected in the other. Through publications such as this one a better perspective is coming to focus. We are learning to appreciate that faults of the hemostatic mechanism may be insignificant, they may cause bleeding, they may permit bleeding (with injury), or they may cause thromboembolism. Of these diseases, bleeding is the most flamboyant and, perhaps, that is why it has received most attention. But thromboembolism kills more people than any other single disorder. We are doing well nowadays to single it out for attention.

The issue of this journal at hand is the best contemporary statement of our clinical and investigative positions with relation to hemostatic disease, both hemorrhagic and thrombotic.

—WILLIAM H. CROSBY, Lt Col., MC, USA

1955 MEDICAL PROGRESS. A Review of Medical Advances During 1954, edited by *Morris Fishbein*, M. D. 346 pages. The Blakiston Div., McGraw-Hill Book Co., Inc., New York, N. Y., 1955. Price \$5.

This book undertakes to present a review of the new advances in the various specialties of medicine occurring since the 1954 edition. This purpose is adequately accomplished by 28 contributors, including many men of importance in American medicine. The majority of these contributors represent three centers of medical education: Chicago, Boston, and Rochester, Minn.

The book will find its greatest usefulness in the hands of the general practitioner of medicine, to whom it offers a moderately comprehensive report of current thought in a single edition. For this reason the book has some value for the military physician practicing in any area except a major military medical center.

Inherent in such a presentation is the difficulty in achieving a proper balance in presenting evidence of progress in the various specialties. The chapter entitled "New Drugs" merits 5 pages. "Cardiovascular Diseases" receives a scant 7 pages, including 2 pages of bibliography, while "Endocrinology" spans a full 36 pages of textual material and 4 pages of bibliography. Many cardiologists would disagree with the author's opinion that "during 1954 nothing spectacular was added to the armamentarium of the physician dealing with cardiovascular diseases."

—DAVID B. CARMICHAEL, Lt. Comdr. (MC) USN

DOCTOR AND PATIENT, by *Desmond O'Neill*, M. D., M. R. C. P. (Lond.), D. P. M. (Eng.). 197 pages. J. B. Lippincott Co., Philadelphia, Pa., 1955. Price \$5.

This book was originally published in England under the title, "A Psychosomatic Approach to Medicine," which I believe to be a better title than that of this edition. Reflecting the author's extensive experience as a specialist in psychiatry, the book will be of most value to the general practitioner, but will also be interesting and helpful to the various specialists. Psychiatrists will enjoy it; their foundation in psychosomatic medicine will be strengthened, and they will benefit especially from the chapter devoted to recent experiments which throw light on physiologic responses to stress. A short chapter discusses the origin, decline, and resurgence of the concept of the whole—the total personality—the conviction that the proper object of the physician's study is the patient and not the disease. One chapter discusses, and quotes figures of, a carefully planned survey of the prevalence of stress disorders which are observed by the general practitioner and specialists. The greater portion of the book is devoted to a discussion of 22 of the more common, major symptom-complexes commonly found in stress disorders. Numerous short case reports are given as illustrations, failures as well as successes are cited, and the probable causes of failure are discussed.

The various therapies of the stress disorders are described for the general practitioner, and for specialists other than psychiatrists. A bibliography consisting of an adequate number of the best references will satisfy the vast majority of readers and is appropriate to this presentation. This small, inviting, unusually readable book is recommended for every physician.—EATON W. BENNETT, Col., MC, USA

**INTESTINAL OBSTRUCTIONS, Physiological, Pathological, and Clinical Considerations with Emphasis on Therapy, Including Description of Operative Procedures,** by *Owen H. Wangensteen*, M. D., Ph. D, 3d edition, 838 pages; illustrated. Charles C Thomas, Publisher, Springfield, Ill., 1955. Price \$15.50.

The first new edition of this book in 15 years reflects the many years of study and experimentation in the physiology laboratory and analysis of the subject by Dr. Wangensteen and his colleagues at the University of Minnesota. The book is well written in an informal style and is printed in most legible type on excellent paper. Illustrations are in black and white and are good. The bibliography is exhaustive.

The first part of the book presents the pathologic physiology of distention, diagnostic considerations, fluid replacement therapy, intestinal intubation as a therapeutic measure, the factors leading to the decision to operate, the selection of the proper operative procedure in the individual patient, and postoperative care and mortality. The remainder of the book concerns itself with specific causes of obstruction, from the common adynamic ileus to the rare internal hernia.

Dr. Wangensteen observes good teaching practice—constant repetition of the points he considers of most importance. He is a stalwart champion of the aseptic closed type of intestinal anastomosis and believes strongly that an open type of anastomosis protected by intestinal antibiotics is an inferior procedure. His belief in this matter is not shared by a majority of surgeons, but there is no denying that, statistically, his method is good. The one-layer anastomosis is also strongly championed. There undeniably is much to recommend it.

The section devoted to the passage into the small bowel of the Grafton-Smith tube with maneuverable stylet control under fluoroscopic visualization is most interesting, as is the discussion of the use of enterostomy in intestinal obstruction.

There is no doubt that this book is no compiling of ideas from the works of other people but, rather, represents the opinions of a skilled and able surgeon and teacher based on many years of his own and his staff's experience in clinic and laboratory. Any surgeon receiving patients from outlying regions knows with what consistency intestinal obstruction can be mishandled. This book is highly recommended for the library of all physicians who may be expected to handle the life-or-death problem of intestinal obstruction.

—DAVID E. THOMAS, Lt. Col., MC, USA

CARDIAC AUSCULTATION, Including Audio-Visual Principles, by J. Scott Butterworth, M. D., Maurice R. Chassin, M. D., and Robert McGrath, M. D. 111 pages; 54 illustrations. Grune & Stratton, Inc., New York, N. Y., 1955. Price \$4.50.

This is a book devoted entirely to auscultation of the heart. The authors take up the history of auscultation, the equipment used in their particular study, and the physics of sound as it pertains to heart murmurs. They then discuss the clinical aspects of heart sounds and murmurs, going into some detail regarding different kinds of sounds, the evaluation of timing, duration, pitch, intensity, and the other factors which help in the interpretation of sounds and murmurs.

This study apparently represents a considerable amount of work over some period of time. The illustrations of heart sound tracings are unusually clear and the technic of recording must have been exceptional.

There are two major criticisms of this work. The first, which may be a personal prejudice of the reviewer, is that studies of this type should not be published expensively in hard covers. The second criticism, which again may be a personal idiosyncrasy, is that this is not the best way to teach physical diagnosis. The study of gross structural cardiac defects requires the liberal use of observation, palpation, and percussion as well as auscultation, plus a liberal assist from radiology and electrocardiography.

This book does serve well the purposes of the authors, and it is a noteworthy contribution to the cardiovascular literature. There is a place for it in every cardiac clinic and medical library.

—RALPH C. PARKER, Jr., Capt. (MC) USN

THE PLASMA PROTEINS IN PREGNANCY, A Clinical Interpretation, by Harold C. Mack, M. D. Foreword by Nicholson J. Eastman, M. D. American Lecture Series, Publication Number 252, A Monograph in American Lectures in Gynecology and Obstetrics, edited by E. C. Hamblen, B. S., M. D., F. A. C. S. 118 pages; illustrated. Charles C Thomas, Publisher, Springfield, Ill., 1955. Price \$3.75.

This is a compact monograph covering a series of clinical and laboratory studies on human plasma proteins in pregnancy from the pre-conceptional state through postpartum readjustment. Use is made of the newer technic of electrophoresis for analysis and comparison of normal and pathologic changes in maternal and fetal physiology. The material presented includes the structure and functions of blood proteins, the plasma proteins in normal pregnancy, the plasma proteins in toxemia, and other disorders of pregnancy and fetal plasma proteins.

The author has attempted to correlate his findings with information he and his collaborators obtained by other methods, as well as with reports of other investigators. To this end, the literature has been extensively reviewed. The limitations of the various analytical procedures, including electrophoresis, are discussed. The author cautions against making generalizations on the basis of information presently

available, because of the multiple factors influencing protein metabolism in pregnancy. A comprehensive bibliography is appended, covering nutrition and nutritional deficiencies, electrolyte and water balance, blood, hemoglobin and plasma proteins, lipoproteins, antibody formation, sodium retention, kidney and liver function, and related subjects connected with protein metabolism in pregnancy.

This book will be of interest to practicing obstetricians generally, and of particular value for reference use by clinical investigators in the field.—*ARMAND J. PEREYRA, Capt. (MC) USN*

**SEXUAL HYGIENE AND PATHOLOGY**, by *John F. Oliven, M. D.* 481 pages. J. B. Lippincott Co., Philadelphia, Pa., 1955. Price \$10.

As its preface states, this volume is "designed to fill the needs of practicing physicians, medical students, and certain groups of ancillary medical workers," and it appears to have fulfilled this intention well. The material is organized into four parts: sexuality in childhood, sexuality in the second decade, sexuality in the normal adult, and sexual pathology. The author gathered much of his material from physicians in general practice who kept records of sexual problems about which they were consulted medically and of information that they would have found helpful at those times. Therefore, we find discussed such diverse problems as those of domestic nudity, enemas, tomboyishness, potnography, petting, contraception, artificial defloration, et cetera, in addition to the usual standard subjects of discussion. Several sections of special interest deal with advice regarding sexual activity of patients with heart disease, obesity, pregnancy, orthopedic impairment, et cetera. The extensive treatment of the subject matter is exemplified by the definitive discussion of aphrodisiacs and anaphrodisiacs.

There is a mass of material covering practically every question any patient might raise in his family physician's consulting room or which the physician might be called upon to answer because of his position in the community. The text is happily not weighted down by footnotes, statistics, charts, tables, or other paraphernalia of the scientific treatise. There is enough theoretical discussion to make it more than a mere tabulation of various sex practices, normal and abnormal, and yet not so much as to make it a textbook of psychiatry or sexology. Only in the section on sexual deviations does the author seem overly concerned with the intricacies of the psychopathology involved. Because of the attempts to comment on all possible aspects of each deviation, this section could well prove confusing to the nonpsychiatric practitioner. Altogether this is a volume regarded as particularly useful to the general practitioner, but it would not be out of place on the bookshelf of the gynecologist, urologist, internist, or psychiatrist. It may be of value as well to the public health nurse and the social worker, provided it is used with proper medical supervision.

—*JAMES N. SUSSEX, Comdr. (MC) USN*

## New Books Received

Books received by the *U. S. Armed Forces Medical Journal* are acknowledged in this department. Those of greatest interest will be selected for review in a later issue.

- PUBLIC HEALTH**, *Its Promise for the Future, A Chronicle of the Development of Public Health in the United States, 1604-1914*, by *Wilson G. Smillie*, M. D., D. P. H., Sc. D. (Hon.) 501 pages; illustrated. The Macmillan Co., New York, N. Y., 1955.
- NEW CONCEPTS IN SURGERY OF THE VASCULAR SYSTEM**, by *Emile Holman*, M. D. American Lecture Series, Publication No. 271, A Monograph in American Lectures in Surgery, edited by *Michael E. De Bakey*, M. D. and *R. Glen Spurling*, M. D. 108 pages; illustrated. Charles C Thomas, Publisher, Springfield, Ill., 1955. Price \$3.50.
- OBSTETRICAL ANESTHESIA**, *Its Principles and Practice*, by *Bert B. Hershenson*, M. D. With a Foreword by *Frederick C. Irving*, M. D. 403 pages; illustrated. Charles C Thomas, Publisher, Springfield, Ill., 1955. Price \$9.50.
- THE YEAR BOOK OF GENERAL SURGERY (1955-1956 Year Book Series)**, edited by *Evarts A. Graham*, M. D. With a Section on Anesthesia, edited by *Stuart C. Cullen*, M. D. 655 pages; illustrated. The Year Book Publishers, Inc., Chicago, Ill., 1955. Price \$6.
- BASIC SURGICAL SKILLS**, *A Manual with Appropriate Exercises*, by *Robert Tauber*, M. D., F. A. C. S. 75 pages; illustrated. W. B. Saunders Co., Philadelphia, Pa., 1955.
- TEXTBOOK OF SURGERY**, edited by *H. F. Moseley*, M. A., D. M., M. Ch. (Oxon), F. A. C. S., F. R. C. S. (Eng.), F. R. C. S. (C). With Foreword by *G. Gavin Miller*, M. D., C. M., M. Sc., F. R. C. S. (C), F. A. C. S. 2d edition. 1,136 pages; with 571 illustrations and 79 color plates. The C. V. Mosby Co., St. Louis, Mo., 1955. Price \$16.50.
- 200 MILES UP**, *The Conquest of the Upper Air*, by *J. Gordon Vaeth*, Head, New Weapons and Systems Division, U. S. Navy Special Devices Center, Office of Naval Research. 2d edition. 258 pages; illustrated. The Ronald Press Co., New York N. Y., 1955. Price \$5.
- ADMINISTRATIVE MEDICINE**, *Transactions of the Third Conference, October 6, 7, and 8, 1954, Princeton, N. J.* Edited by *George S. Stevenson*, M. D. 172 pages. Sponsored by the Josiah Macy, Jr. Foundation, New York, N. Y. Published by Josiah Macy, Jr. Foundation Publications, Packanack Lake, N. J., 1955. Price \$3.
- HYPOTHERMIC ANESTHESIA**, by *Robert W. Virtue*, M. D., Ph. D. American Lecture Series, Publication Number 275, A Monograph in American Lectures in Anesthesiology, edited by *John Adriani*, M. D. 62 pages. Charles C Thomas, Publisher, Springfield, Ill., 1955. Price \$2.50.
- CHLORPROMAZINE AND MENTAL HEALTH**, *Proceedings of the Symposium Held under the Auspices of Smith, Kline, & French Laboratories, June 6, 1955, Warwick Hotel, Philadelphia, Pa.* 290 pages; illustrated; 25 tables. Lea & Febiger, Philadelphia, Pa., 1955. Price \$3.

available, because of the multiple factors influencing protein metabolism in pregnancy. A comprehensive bibliography is appended, covering nutrition and nutritional deficiencies, electrolyte and water balance, blood, hemoglobin and plasma proteins, lipoproteins, antibody formation, sodium retention, kidney and liver function, and related subjects connected with protein metabolism in pregnancy.

This book will be of interest to practicing obstetricians generally, and of particular value for reference use by clinical investigators in the field.—*ARMAND J. PEREYRA, Capt. (MC) USN*

**SEXUAL HYGIENE AND PATHOLOGY**, by *John F. Olwen, M. D.* 481 pages. J. B. Lippincott Co., Philadelphia, Pa., 1955. Price \$10.

As its preface states, this volume is "designed to fill the needs of practicing physicians, medical students, and certain groups of ancillary medical workers," and it appears to have fulfilled this intention well. The material is organized into four parts: sexuality in childhood, sexuality in the second decade, sexuality in the normal adult, and sexual pathology. The author gathered much of his material from physicians in general practice who kept records of sexual problems about which they were consulted medically and of information that they would have found helpful at those times. Therefore, we find discussed such diverse problems as those of domestic nudity, enemas, tomboyishness, pornography, petting, contraception, artificial defloration, et cetera, in addition to the usual standard subjects of discussion. Several sections of special interest deal with advice regarding sexual activity of patients with heart disease, obesity, pregnancy, orthopedic impairment, et cetera. The extensive treatment of the subject matter is exemplified by the definitive discussion of aphrodisiacs and anaphrodisiacs.

There is a mass of material covering practically every question any patient might raise in his family physician's consulting room or which the physician might be called upon to answer because of his position in the community. The text is happily not weighted down by footnotes, statistics, charts, tables, or other paraphernalia of the scientific treatise. There is enough theoretical discussion to make it more than a mere tabulation of various sex practices, normal and abnormal, and yet not so much as to make it a textbook of psychiatry or sexology. Only in the section on sexual deviations does the author seem overly concerned with the intricacies of the psychopathology involved. Because of the attempts to comment on all possible aspects of each deviation, this section could well prove confusing to the nonpsychiatric practitioner. Altogether this is a volume regarded as particularly useful to the general practitioner, but it would not be out of place on the bookshelf of the gynecologist, urologist, internist, or psychiatrist. It may be of value as well to the public health nurse and the social worker, provided it is used with proper medical supervision.

—*JAMES N. SUSSEX, Comdr. (MC) USN*

## New Books Received

Books received by the U. S. Armed Forces Medical Journal are acknowledged in this department. Those of greatest interest will be selected for review in a later issue.

- PUBLIC HEALTH**, Its Promise for the Future, A Chronicle of the Development of Public Health in the United States, 1604-1914, by *Wilson G. Smillie*, M. D., D. P. H., Sc. D. (Hon.) 501 pages; illustrated. The Macmillan Co., New York, N. Y., 1955.
- NEW CONCEPTS IN SURGERY OF THE VASCULAR SYSTEM**, by *Emile Holman*, M. D. American Lecture Series, Publication No. 271, A Monograph in American Lectures in Surgery, edited by *Michael E. De Bakey*, M. D. and *R. Glen Spurling*, M. D. 108 pages; illustrated. Charles C Thomas, Publisher, Springfield, Ill., 1955. Price \$3.50.
- OBSTETRICAL ANESTHESIA**, Its Principles and Practice, by *Bert B. Her-shenson*, M. D. With a Foreword by *Frederick C. Irving*, M. D. 403 pages; illustrated. Charles C Thomas, Publisher, Springfield, Ill., 1955. Price \$9.50.
- THE YEAR BOOK OF GENERAL SURGERY (1955-1956 Year Book Series)**, edited by *Evarts A. Graham*, M. D. With a Section on Anesthesia, edited by *Stuart C. Cullen*, M. D. 655 pages; illustrated. The Year Book Publishers, Inc., Chicago, Ill., 1955. Price \$6.
- BASIC SURGICAL SKILLS**, A Manual with Appropriate Exercises, by *Robert Tauber*, M. D., F. A. C. S. 75 pages; illustrated. W. B. Saunders Co., Philadelphia, Pa., 1955.
- TEXTBOOK OF SURGERY**, edited by *H. F. Moseley*, M. A., D. M., M. Ch. (Oxon), F. A. C. S., F. R. C. S. (Eng.), F. R. C. S. (C). With Foreword by *G. Gavin Miller*, M. D., C. M., M. Sc., F. R. C. S. (C), F. A. C. S. 2d edition. 1,136 pages; with 571 illustrations and 79 color plates. The C. V. Mosby Co., St. Louis, Mo., 1955. Price \$16.50.
- 200 MILES UP**, The Conquest of the Upper Air, by *J. Gordon Vaeth*, Head, New Weapons and Systems Division, U. S. Navy Special Devices Center, Office of Naval Research. 2d edition. 258 pages; illustrated. The Ronald Press Co., New York N. Y., 1955. Price \$5.
- ADMINISTRATIVE MEDICINE**, Transactions of the Third Conference, October 6, 7, and 8, 1954, Princeton, N. J.: Edited by *George S. Stevenson*, M. D. 172 pages. Sponsored by the *Josiah Macy, Jr. Foundation*, New York, N. Y. Published by *Josiah Macy, Jr. Foundation Publications*, Packanack Lake, N. J., 1955. Price \$3.
- HYPOTHERMIC ANESTHESIA**, by *Robert W. Virtue*, M. D., Ph. D. American Lecture Series, Publication Number 275, A Monograph in American Lectures in Anesthesiology, edited by *John Adriani*, M. D. 62 pages. Charles C Thomas, Publisher, Springfield, Ill., 1955. Price \$2.50.
- CHLORPROMAZINE AND MENTAL HEALTH**, Proceedings of the Symposium Held under the Auspices of Smith, Kline, & French Laboratories, June 6, 1955, Warwick Hotel, Philadelphia, Pa. 290 pages; illustrated; 25 tables. Lea & Febiger, Philadelphia, Pa., 1955. Price \$3.



- MODERN NUTRITION IN HEALTH AND DISEASE, DIETOTHERAPY, edited by Michael G. Wohl, M. D. and Robert S. Goodhart, M. D. 55 contributors. 1,062 pages; 80 illustrations; 127 tables. Lea & Febiger, Philadelphia, Pa., 1955. Price \$18.50.
- THE MANAGEMENT OF OBSTETRIC DIFFICULTIES, by Paul Titis, revised by J. Robert Hillson, M. D., M. S. 5th edition. 737 pages; 348 text illustrations and one color plate. The C. V. Mosby Co., St. Louis, Mo., 1955. Price \$12.50.
- PERSONNEL AUDIT AND APPRAISAL, by Thomas J. Luck. 317 pages. McGraw-Hill Book Co., Inc., New York, N. Y., 1955. Price \$6.
- HOW TO REDUCE SURELY AND SAFELY, by Herbert Pollack, M. D. with Arthur D. Morse. 157 pages. McGraw-Hill Book Co., Inc., New York, N. Y., 1955. Price \$2.95.
- PROBLEMS IN AMOEBIASIS, by Charles William Rees, Ph. D. 119 pages; illustrated. Charles C Thomas, Publisher, Springfield Ill., 1955. Price \$4.75.
- OPERATIVE TECHNIC IN GENERAL SURGERY, edited by Warren H. Cole, M. D., F. A. C. S. 67 contributing authors. Introduction by Frank H. Lahey, 2d edition, 1,004 pages; 1,247 illustrations. Appleton-Century-Crofts, Inc., New York, N. Y., 1955. Price \$20.
- THE BACK AND ITS DISK SYNDROMES. Including Injuries, Diseases, Deformities and Disabilities, with Notes on the Pelvis and Coccyx, by Philip Lewin, M. D., F. A. C. S., F. I. C. S. 2d edition, thoroughly revised. 942 pages; 371 illustrations and 4 color plates. Line drawings by Harold Laufman, M. D. Lea & Febiger, Philadelphia, Pa., 1955. Price \$18.50.
- ATOPIC DERMATITIS, edited by Rudolf L. Baer, M. D. 112 pages; illustrated. J. B. Lippincott Co., Philadelphia, Pa., 1955. Price \$2.50.
- AMERICAN PHARMACY, Textbook of Pharmaceutical Principles, Processes and Preparations, edited by Rufus A. Lyman, M. D., and Joseph B. Sprouls, Ph. D. Consulting Editor, George Urdang, Ph. G., D. Sc. Nat., Sc. D. (h. c.) 4th edition. 478 pages; illustrated. J. B. Lippincott Co., Philadelphia, Pa., 1955. Price \$9.75.
- DEVELOPING YOUR EXECUTIVE SKILLS, by Auren Urus. 270 pages. McGraw-Hill Book Co., Inc., New York, N. Y., 1955. Price \$4.50.
- PHARMACOLOGY IN NURSING, by Elsie E. Krug, R. N., M. A., and Hugh Alister McGugan, Ph. D., M. D. 703 pages; illustrated, with 41 text illustrations and 8 color plates. 7th edition. The C. V. Mosby Co., St. Louis, Mo., 1955. Price \$4.75.
- PEPTIC ULCER, Diagnosis and Treatment, by Clifford J. Barborka, M. D., M. S., D. Sc., F. A. C. P., and E. Clinton Texter, Jr., M. D. 290 pages; 33 illustrations. Little, Brown & Co., Boston, Mass., 1955. Price \$7.
- THE DISEASES OF OCCUPATIONS, by Donald Hunter, M. D., F. R. C. P. 1,046 pages; illustrated. Little, Brown & Co., Boston, Mass., 1955. Price \$20.
- HUMAN PHYSIOLOGY, by F. R. Winton, M. D., D. Sc., and L. E. Bayliss, Ph. D. 4th edition. 616 pages; 236 illustrations. Little, Brown & Co., Boston, Mass., 1955. Price \$8.
- FORENSIC MEDICINE, A Textbook for Students and Practitioners, by Sir Sydney Smith, C. B. E., LL. D., and Frederick Smith Fiddes, O. B. E., M. D. 10th edition. 644 pages; 173 illustrations. Little, Brown & Co., Boston, Mass., 1955. Price \$10.

- PRACTICAL ORTHODONTICS. Original text by the late *Martin Dewey*, 5th, 6th, 7th, and 8th editions revised by *George M. Anderson*, D. D. S. 8th edition. 702 pages; illustrated. The C. V. Mosby Co., St. Louis, Mo., 1955. Price \$17.50.
- CLINICAL ANALGETICS, by *E. G. Gross*, Ph. D., M. D. and *M. J. Schiffrin*, Ph. D. American Lecture Series, Publication No. 273, A Monograph in American Lectures in Pharmacology, edited by *Chauncey D. Leake*, Ph. D. 101 pages; illustrated. Charles C Thomas, Publisher, Springfield, Ill., 1955. Price \$3.
- PATHOLOGY SEMINARS, by *Lauren V. Ackerman*, M. D., F. C. A. P., *Arthur C. Allen*, M. D., *Colonel J. E. Ash*, M. D., F. C. A. P., *Arthur Purdy Stout*, M. D., *Rupert A. Willis*, M. D., F. R. C. P. Edited by *Robert S. Haukohl*, M. S., M. D., F. C. A. P., and *W. A. D. Anderson*, M. A., M. D., F. A. C. P., F. C. A. P. 195 pages; illustrated. The C. V. Mosby Co., St. Louis, Mo., 1955. Price \$10.
- PRINCIPLES OF PUBLIC HEALTH ADMINISTRATION, by *John J. Hanlon*, M. S., M. D., M. P. H. 693 pages; 47 illustrations. 2d edition. The C. V. Mosby Co., St. Louis, Mo., 1955. Price \$4.75.
- THE CORNEA, by *Charles I Thomas*, M. D. 1,318 pages; 400 illustrations. Charles C Thomas, Publisher, Springfield, Ill., 1955. Price \$30.
- THE LACRIMAL SYSTEM, Clinical Application, by *Everett R. Veirs*, M. D. 159 pages; illustrated. Grune & Stratton, Inc., New York, N. Y., 1955. Price \$7.50.
- THE YEAR BOOK OF OBSTETRICS AND GYNECOLOGY (1955-1956 Year Book Series), edited by *J. P. Greenhill*, M. D., F. A. C. S. 544 pages; illustrated. The Year Book Publishers, Inc., Chicago, Ill., 1955. Price \$6.
- PSYCHOSOMATICS, by *Max Hamilton*, M. D., D. P. M. With a foreword by Professor *D. R. MacCalman*, M. D., F. R. C. P. E. 225 pages; illustrated. John Wiley & Sons, Inc., New York, N. Y., 1955. Price \$4.25.
- THE THYROID: A FUNDAMENTAL AND CLINICAL TEXT. Sixty Contributors. *Sidney C. Werner*, M. D., Sc. D. (Med.), Editor. 789 pages; illustrated. Paul B. Hoeber, Inc., Medical Book Department of Harper & Bros., New York, N. Y., 1955. Price \$20.
- THE SHOULDER AND ENVIRONS, by *James E. Bateman*, M. D., F. R. C. S. (C). Drawings by *Louise Gordon*. 565 pages; illustrated. The C. V. Mosby Co., St. Louis, Mo., 1955. Price \$16.25.
- ATOMIC ENERGY RESEARCH AT HARWELL, by *K. E. B. Jay*. 144 pages; illustrated. Philosophical Library, Inc., New York, N. Y., 1955. Price \$4.75.
- THE MEDICAL DEPARTMENT OF THE UNITED STATES ARMY. Preventive Medicine in World War II. Volume II - Environmental Hygiene. Prepared in the Historical Unit, Army Medical Service. Editor-in-Chief, Colonel *John Boyd Coates, Jr.*, MC. Editor for Preventive Medicine, *Ebbe Curtis Hoff*, Ph. D., M. D. 404 pages; illustrated. Office of the Surgeon General, Department of the Army, Washington, D. C., 1955. For sale by the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C. Price \$3.50.
- GROUP PROCESSES, Transactions of the First Conference, September 26, 27, 28, 29 and 30, 1954, Ithaca, N. Y., edited by *Bertram Schaffner*, M. D. 334 pages; illustrated. Sponsored by the Josiah Macy, Jr. Foundation, New York, N. Y. Published by Josiah Macy, Jr. Foundation Publications, Packanack Lake, N. J., 1955. Price \$5.50.

- A TEXTBOOK OF CLINICAL PATHOLOGY, Edited by *Seward E. Miller*, M. O. 5th edition. 1,208 pages; illustrated. The Williams & Wilkins Co., Baltimore, Md., 1955. Price \$11.
- AN ELEMENTARY TEXTBOOK OF PSYCHOANALYSIS, by *Charles Brenner*, M. O. 219 pages. International Universities Press, Inc., New York, N. Y., 1955. Price \$4.
- SUBACUTE BACTERIAL ENDOCARDITIS, by *Andrew Kerr, Jr.*, M. D. American Lecture Series, Publication No. 274, A Monograph in the Bannerstone Division of American Lectures in Internal Medicine, edited by *Roscoe L. Pullen*, M. O., F. A. C. P. 343 pages. Charles C Thomas, Publisher, Springfield, Ill., 1955. Price \$6.50.
- ATLAS OF GENERAL SURGERY, by *Joseph R. Wilder*, M. D. 222 pages; 101 plates. The C. V. Mosby Co., St. Louis, Mo., 1955. Price \$13.50.
- PRACTICAL NEUROLOGY, by *Leo M. Davidoff*, M. O., and *Emanuel H. Fering*, M. O. 442 pages. Landsberger Medical Books, Inc. Distributed solely by the Blakiston Division of the McGraw-Hill Book Co., Inc., New York, N. Y., 1955. Price \$7.
- REHABILITATION OF A CHILD'S EYES, by *Richard G. Scobee*, M. O., F. A. C. S. Revised by *Herbert M. Katzin*, M. O., F. A. C. S. 2d edition. 133 pages; illustrated. The C. V. Mosby Co., St. Louis, Mo., 1955. Price \$2.85.
- THE TREATMENT OF RENAL FAILURE, Therapeutic Principles in the Management of Acute and Chronic Uremia, by *John P. Merrill*, M. D. 238 pages; illustrated. Grune & Stratton, Inc., New York, N. Y., 1955. Price \$6.75.
- COMPLICATIONS OF REGIONAL ANESTHESIA, Etiology, Signs and Symptoms, Treatment, by *Daniel C. Moore*, M. O. 291 pages; illustrated. Charles C Thomas, Publisher, Springfield, Ill., 1955. Price \$10.50.
- MEDICAL SUPPORT OF THE ARMY AIR FORCES IN WORLD WAR II, by *Mae Mills Link* and *Hubert A. Coleman*. 1,027 pages; illustrated. Office of the Surgeon General, Department of the Air Force, Washington, O. C., 1955. For sale by the Superintendent of Documents, U. S. Government Printing Office, Washington 25, O. C. Price \$7.
- INLAYS AND ABUTMENTS, Their Preparation and Construction for Dental Restorations, by *Jacob R. Schwartz*, O. O. S. 478 pages; 512 illustrations. Dental Items of Interest Publishing Co., Inc., Brooklyn, N. Y., 1953. Price \$8.
- OF RESEARCH PEOPLE, by *George E. Burch*, M. D., F. A. C. P. 56 pages; illustrated. Grune & Stratton, Inc., New York, N. Y., 1955. Price \$3.
- THROMBOEMBOLIC DISEASE, by *Geza De Takats*, M. D., M. S., F. A. C. S. American Lecture Series, Publication No. 286, A Monograph in American Lectures in Surgery, Edited by *Michael E. DeBakey*, M. D. and *R. Glen Spwing*, M. D. 55 pages. Charles C Thomas, Publisher, Springfield, Ill., 1955. Price \$2.25.
- THE SURGICAL TECHNIC OF ABDOMINAL OPERATIONS, by *Julius L. Spravack*, M. D., LL. D., F. A. C. S. 5th edition. 931 pages; 1,037 illustrations on 495 figures, mostly original. Charles C Thomas, Publisher, Springfield, Ill., 1955. Price \$17.50.
- ANNALS OF THE NEW YORK ACADEMY OF SCIENCES, Volume 63, Art. 2, Pages 145-318, October 28, 1955. Editor: *Roy Waldo Miner*. "Nutrition in Infections." Conference Chairman and Consulting Editor: *W. Alan Wright*. 174 pages; illustrated. The New York Academy of Sciences, New York, N. Y., 1955. Price \$4.



## Monthly Message

This office is particularly happy to announce this month the departure of two teams to study nutritional problems of the armed forces in Iran and Pakistan. These teams will operate under the auspices of this office through the Interdepartmental Committee on Nutrition, of which I am chairman.

A preliminary survey of the needs of these countries was made during a trip to the Near East last April by Dr. Dwight L. Wilbur, the late Dr. Harold R. Sandstead, Commander Henry T. Gannon (MC) USN, and me. A most generous and cordial reception was afforded us and full cooperation extended by the two governments involved and by our own Military Assistance Groups. Funding has been provided through the Assistant Secretary of Defense for International Security Affairs. Dr. Sandstead was to have been the leader of these groups, but due to his tragic death recently in the sabotaged airliner out of Denver, it was thought momentarily that our plans would have to be abandoned. Fortunately, however, Dr. John B. Youmans, Dean of Vanderbilt Medical School, Nashville, Tenn., has obtained leave of absence and kindly consented to accompany the teams during the first part of their stay.

It is anticipated that these surveys will require between two and three months, during which period instruction will be given to the nationals of the two countries visited. All equipment will be left with them to continue the work as they wish, and it is our aim to act in consultative capacity for them whenever they so desire. We consider this a great step forward in giving practical aid not only to the military establishments of these countries, but also to the people themselves.

*Frank B. Berry*

FRANK B. BERRY, M. D.  
Assistant Secretary of Defense  
(Health and Medical)

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## Foreword

The *United States Armed Forces Medical Journal* is the medium for disseminating information of administrative and professional interest to all medical personnel of the Department of Defense. The Assistant Secretary of Defense (Health and Medical) and the Surgeons General of the several services invite all medical officers, dental officers, Medical Service Corps officers, Nurse Corps officers, and officers of the Veterinary Corps of the Armed Forces, and the medical consultants of the Army, Navy, and Air Force to submit manuscripts for publication in this journal.

FRANK B. BERRY, M. D.,  
*Assistant Secretary of Defense (Health and Medical)*  
MAJOR GENERAL SILAS B. HAYS,  
*Surgeon General, United States Army.*  
REAR ADMIRAL BARTHOLOMEW V. HOGAN,  
*Surgeon General, United States Navy.*  
MAJOR GENERAL DAN C. OGLE,  
*Surgeon General, United States Air Force.*

# UNITED STATES ARMED FORCES MEDICAL JOURNAL

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## ANTIMICROBIAL THERAPY OF PULMONARY TUBERCULOSIS

### Current Status

PATRICK B. STOREY, *Captain, MC, USA*

JAMES A. WIER, *Colonel, MC, USA*

**E**FFECTIVE chemotherapy against tuberculosis in man first became available with the advent of streptomycin (SM) in 1946. In the 9 years since that time a vast amount of research has gone into the evaluation of technics of treatment with new drugs. There are still many serious problems in the treatment of pulmonary tuberculosis which await solution.

The response of tuberculous lesions of the lung to our present methods of chemotherapy seems to depend greatly on the age and morphology of the disease. Recent lesions of principally exudative character for the most part clear dramatically and more or less completely. Older lesions, associated with varying degrees of caseation necrosis, cavity formation, and fibrosis, respond less favorably and incompletely to chemotherapy. The statement may be made that the success of our present chemotherapy lies in its ability to (1) control recent exudative disease, (2) prevent further spread from caseonecrotic lesions, and (3) allow the body to proceed with its function of walling off and fibrosing the chronic nidus of infection.

Available studies from many sources to date indicate that variable chemotherapeutic regimens with presently available drugs, are very successful in achieving these objectives. Those regimens tested include daily SM with daily para-aminosalicylic acid (PAS); intermittent SM with daily PAS; intermittent SM with daily isoniazid (isonicotinic acid hydrazide, INH); daily INH with daily PAS; and intermittent SM with daily INH and PAS. Therapeutic differences among these regimens are slight, and probably depend on the pathologic type of tuberculosis under treatment. For ex-

From Fitzsimons Army Hospital, Denver, Colo. Capt. Storey is now at Veterans Administration Hospital, Baltimore, Md.



ample, patients with chronic disease with large cavities may respond more favorably to therapy with all three drugs,<sup>1</sup> whereas no such difference would be detected in the management of more acute, less destructive disease whether the treatment be SM-INH-PAS, SM-INH, SM-PAS, or even INH alone.

Regardless of regimen, however, two problems have not been solved: (1) the persistent cavity after treatment, and (2) the residual caseonodose lesion which almost invariably contains *Mycobacterium tuberculosis*. These may be seen readily on direct smear or tissue stain of the excised tissue. It appears, too, that with suitable technic a majority of such lesions yield organisms which can be grown.<sup>1</sup> There are as yet no extended follow-up studies to show how dangerous these caseous foci are after long-term drug therapy has been completed. Consequently, there is presently a sharp difference of opinion as to how vigorous one should be in the surgical removal of these residual lesions.

The persistent cavity poses less of a problem in the sense that the indication for surgical excision appears more clear-cut because persistent cavity with persistently positive sputum is synonymous with the eventual appearance of drug resistance of the organisms.<sup>1</sup>

It would seem then that there are two principal clinical objectives in the use of chemotherapy for pulmonary tuberculosis. The first would be cure of the disease by the use of drug therapy alone. This might be accomplished relatively readily if the lesion were of a suitable type as mentioned above, as, for example, in the patient with an early minimal lesion detected on a routine roentgenogram, or in the patient with the multiple exudative lesions of milinary tuberculosis. Or this objective of chemotherapy might be accomplished with difficulty over a long time, perhaps 2 or 3 years, in the patient with more chronic disease who for many reasons might not be suitable for surgical intervention. The second principal objective of chemotherapy would be to render the patient suitable for a necessary corrective operation, the need for which was obvious from the beginning or became apparent during treatment.

With these different objectives, drug combinations must meet different requirements, depending on the presenting clinical problem. A patient who is to have drugs for 12 months coupled with an operation to remove his focus of disease may be suitable for the very innocuous regimen of intermittent SM combined with daily INH, whereas the patient with more advanced disease involving both lungs who will require long-term chemotherapy without benefit of an operation will be a candidate for SM-PAS or INH-PAS, thus preserving sensitivity to one of the two best available drugs over a longer time.

In view of these factors, the following points may be made in the present limits of our knowledge without drawing serious objections:

1. That every patient with active pulmonary tuberculosis should receive chemotherapy.
2. That chemotherapy should be started as soon as possible, realizing that the longer a lesion exists prior to chemotherapy the less chance it has of being reversible.
3. That intermittent SM combined with daily PAS is effective treatment.
4. That, therefore, when a patient is seen with a reasonable diagnosis of pulmonary tuberculosis and after appropriate material for culture purposes has been secured, he should be started on treatment with SM-PAS to cover the period of delay that usually exists prior to his admission to a facility for the definitive treatment of his tuberculosis. This form of treatment will not be harmful and may be of considerable benefit to the patient.

Once initiated, the course of chemotherapy should be long. It is known from experience that short-term treatment, for example, from 4 to 6 months, is usually not adequate. This is known from relapse rates of treated patients, from the fact that chest roentgenograms continue to show improvement through at least 8 months of chemotherapy, and from the fact that patients who are operated on for residual lesions after 8 months or more of chemotherapy still show morphologic evidence of active disease. It is now commonly accepted, therefore, that any patient who is started on chemotherapy for tuberculosis will receive long-term treatment, of at least a year's duration. It is not presently known, although extensive current studies are in progress to try to determine, what the proper lower limit of duration of therapy is and what may be the proper upper limit.

### CHEMOTHERAPY

Our presently available drugs, both well-tried and new, will be considered in the light of the previously mentioned facts. Any antituberculous drug must be considered in relation to three qualities: (1) its effectiveness against the *Myco. tuberculosis* in vitro, in the experimental animal, and in the human body; (2) the potential development of bacterial resistance to it and the clinical significance of this resistance; and (3) the clinical toxicity of the drug.

Streptomycin and INH are markedly potent agents; viomycin is moderately so, and PAS and terramycin (brand of oxytetracycline) have slight antituberculous effect. Pyrazinamide, an analogue of nicotinamide, must still be considered an experimental drug. It has some degree of effectiveness by itself, but is markedly effec-

tive in combination with INH. The newest drug available is cycloserine which is still in the early investigative phase.

**Streptomycin.** Streptomycin, when used alone and given daily, was found to be very effective, but this effectiveness was limited by the rapid development of organism resistance and by the high incidence of vestibular nerve damage. It was recognized that with the emergence of bacterial resistance, clinical effectiveness of the drug was lost, and deterioration of the patient ensued. Because of the vestibular toxicity, dihydrostreptomycin was introduced, and was found to be as effective therapeutically as streptomycin, and produced less vestibular damage. However, there was an alarming incidence of irreversible nerve deafness following the use of dihydrostreptomycin, and clinicians were left in the position of preferring a dizzy patient to a deaf one. Because this eighth nerve effect of the streptomycins seemed to be a function directly related to quantity used, more recently half-and-half mixtures such as duomycin, combistrep, or distrycin have been introduced. These preparations are still under investigation but appear to offer a solution to the problem of daily streptomycin therapy when it is indicated.

The next step in the evolution of streptomycin therapy was to give it every third day instead of daily. It was noted that the therapeutic effect of the drug was preserved, the incidence of toxicity was markedly diminished, and the incidence of bacterial resistance was reduced, but still remained about 33 per cent at 4 months (table 1).

TABLE 1. Incidence of bacterial resistance in various trials with streptomycin alone

Number of cases	Dose (grams)	Duration (days)	Percentage of patients with resistant bacteria at 120 days
100	2 daily	120	72
37	1 daily	120	67
21	1 daily	42	25
67	1 daily	20	5
28	$\frac{1}{2}$ daily	20	0
50	1 every third day	120	34
50	2 every third day	120	32

In a third series, 12 grams daily of PAS was added to intermittent regimen with streptomycin. The therapeutic effect was

obviously superior to that obtained with streptomycin alone and the incidence of resistance was reduced to zero at the end of 4 months.

However, the problem of PAS toxicity and patient intolerance for that drug was now added. Because of this, intermittent PAS therapy was tried in combination with intermittent streptomycin. The therapeutic response was good, but 29 per cent of those patients with positive sputum at the end of 4 months were resistant. Because this figure approximated that obtained with intermittent streptomycin alone, it was concluded that intermittent PAS therapy was not effective.

Intermittently used streptomycin combined with PAS daily was thus established as effective chemotherapy for pulmonary tuberculosis. One hundred and twenty-three patients with positive sputum and moderately advanced or far-advanced disease, were then treated for 8 months with this regimen. Of these, 94 per cent converted to persistently negative sputum cultures. Of the seven patients with positive cultures, one had organisms resistant to streptomycin (table 2).

In an extensive investigation of three SM-PAS regimens (1 gram daily SM-PAS;  $\frac{1}{2}$  gram daily SM-PAS; and intermittent SM-PAS) carried out by the Veterans Administration, no significant differences in therapeutic effectiveness were observed.<sup>4,5</sup> However, in studies of the British Medical Research Council it was reported that there was a definite reduction in number of *Myco. tuberculosis* resistant to INH at the end of 3 and 6 months of drug therapy when SM was given 1 gram daily rather than twice weekly in combination with 200 mg. of INH.<sup>6</sup>

*Isoniazid*. Isonicotinic acid hydrazide (isoniazid, INH) has now been under extensive laboratory and clinical investigation for 3 years. In the earliest clinical studies iproniazid (an isopropyl derivative of INH) was used more frequently than isoniazid, but because of its high incidence of toxicity it has been almost completely supplanted by isoniazid in clinical use. About half of the patients treated with iproniazid develop toxic symptoms, principally dizziness, but also many other symptoms such as muscle twitchings, blurred vision, and headaches, which will be severe enough to require discontinuation of the drug.<sup>7</sup> On the other hand, in a study of 170 patients at this hospital, clinical toxicity attributable to INH has been minimal. The one serious toxic effect reported has been peripheral neuritis, which is related to the dose of INH used. At 300 mg. of INH daily, peripheral neuritis is very rare, but as the dose is increased it becomes more frequent.<sup>8</sup> When high doses of INH are used the simultaneous administration of pyridoxine will prevent the occurrence of neuritis in most instances.

TABLE 2. *Koenigenographic and bacteriologic evaluation of combined SM-PAS-INH therapy*

Regimen	4 months			6 months			8 months		
	SM-PAS	SM-INH	SM-PAS-INH	SM-PAS	SM-INH	SM-PAS-INH	SM-PAS	SM-INH	SM-PAS-INH
Number of patients	147	122	104	146	110	98	123	93	96
Moderate or marked improvement	33%	39%	46%	58%	66%	69.4%	66%	80%	81%
Cavity no longer visible	26 of 103 or 25%	35 of 89 or 39%	29 of 71 or 40%	51 of 102 or 51%	51 of 82 or 62%	34 of 69 or 49.3%	55 of 90 or 61%	49 of 71 or 69%	40 of 62 or 64.5%
Negative sputum culture	129 (88%)	113 (93%)	97 (93%)	136 (93%)	105 (95%)	96 (98%)	116 (94%)	90 (97%)	93 (97%)
Positive sputum culture	18 (12%)	9 (7%)	7 (7%)	10 (7%)	5 (5%)	2 (2%)	7 (6%)	3 (3%)	3 (3%)
Sensitive	16	6	6	8	3	2	6	2	1
Resistant to SM	0	2	0	1	1	0	1	0	1
Resistant to INH	0	1	0	0	0	0	0	0	1
Not available	2	0	1	1	1	0	0	1	1

SM resistance defined as growth in 10  $\mu$ g/ml. of culture media.INH resistance defined as growth in 5  $\mu$ g/ml. of culture media.

INH is a bacteriostatic drug, which is effective only against mycobacteria. At least in vitro, it is no more effective in massive quantities than in small quantities. The significance of this in the treatment of persons with tuberculosis is not yet known and is currently under investigation. The drug probably works by interference with the formation of an essential metabolite. Isotopic studies with C-14 labeled INH in the culture medium show that INH-sensitive organisms absorb and fix the INH, whereas INH-resistant organisms do not. It has also been shown that, in contrast to streptomycin or PAS, INH affects intracellular as well as extracellular bacilli.<sup>9-11</sup>

The therapeutic effectiveness of this drug when used alone has been gratifying, and it is believed that it possesses at least the same range of efficacy as streptomycin. However, the *Myco. tuberculosis* from the 54 per cent of the patients who had a positive sputum culture at the end of 4 months of therapy was resistant to 1  $\mu$ g. of INH per ml., and that from 33 per cent was resistant to 5  $\mu$ g. per ml.

This last fact leads immediately to one of the most important problems in the chemotherapy of tuberculosis: What is the significance of INH resistance? At first it was presumed that it had the same ominous significance as the appearance of resistance to streptomycin and ipso facto treatment with INH alone was supplanted by treatment with INH in combination with other drugs. It soon became known, however, that unlike streptomycin-resistant organisms, INH-resistant *Myco. tuberculosis* developed in vitro lost their virulence for guinea pigs. With further development of cultural technics it became apparent that this was also true of resistant mutants developed in vivo under INH therapy. This loss of virulence was then correlated with loss of catalase activity by the *Myco. tuberculosis*, and INH-resistant bacilli could be graded according to their catalase activity. It has been shown, for example, that strains resistant to 1  $\mu$ g. of INH per ml., and even to 10  $\mu$ g. per ml., that are still catalase positive, are at most only moderately attenuated for guinea pigs and will cause fatal tuberculosis after intravenous injection. On the other hand, catalase-negative resistant organisms do not produce lethal disease in the guinea pig. Quantitative studies of catalase activity related to pathogenicity for monkeys have been found to correlate in that INH-resistant, catalase-positive organisms were pathogenic and INH-resistant, catalase-negative organisms were not.<sup>11</sup> This emphasizes the important clinical proposition of producing INH-resistant, catalase-negative organisms rather than INH-resistant, catalase-positive organisms, although it has not yet been shown that such organisms have retained or lost their virulence for humans. Studies to elucidate the matter of INH resistance are currently being carried out as are other clinical studies on INH therapy alone.

The use of the combination of streptomycin intermittently and INH daily in 122 patients treated at this hospital produced additive therapeutic effects which equaled or slightly surpassed results obtained with SM-PAS therapy (table 2).

At this point a comment should be made with reference to the make-up of these series of patients. Although the patients were not selected and represent consecutive patients with positive sputum, and moderately or far advanced disease, yet they are in a sense selected by the fact that this is a military hospital. Therefore, these are for the most part young men in the prime of life with relatively recently acquired disease who have not had previous chemotherapy. If they were patients with more chronic disease, who had thick-walled cavities, or if they had had previous chemotherapy even though still streptomycin-sensitive, then we might expect a higher incidence of positive sputum cultures at the completion of 8 months of treatment. In such situations the clinical and bacteriologic studies of the U. S. Public Health Service indicate that the *Myco. tuberculosis* will become resistant to both streptomycin and INH within the relatively short period of 7 months. If these patients were not then suitable for surgical treatment this would represent a serious situation in that sensitivity would be lost to both major drugs. From the practical standpoint at this hospital the combination of SM-INH is an excellent therapeutic regimen, with very low incidence of toxicity, and will produce the desired clinical objective in almost all cases. It is recognized, however, that under other circumstances this may well not be the regimen of choice.

Because of the appearance of resistance to both major drugs when the combination of SM-INH is used, the U. S. Public Health Service has initiated studies in an attempt to find a therapeutic regimen as effective as SM-INH but one which would not result in the development of such resistance." This study was designed specifically to: (1) find out if there is any advantage to using an increased dose of INH (10 mg. per kg. instead of 3 mg. per kg.); (2) evaluate the regimen INH-PAS; and (3) to determine if any benefit is to be derived from the simultaneous use of all three drugs, SM-INH-PAS. At the completion of 8 months of the study, observations indicate that increasing the dose of INH increases the incidence of drug toxicity, but does not increase its therapeutic effect. The combination of INH and PAS appears to have as good a therapeutic effect as SM-INH, with the obvious advantage of not having used streptomycin. The use of all three drugs simultaneously, from the therapeutic standpoint alone, seems to offer no advantage over the other regimens.

Recently reported results from the Veterans Administration's cooperative study are interesting in this regard. In a random comparison of INH-PAS, SM-INH, and SM-PAS in the treatment of

far advanced disease, there is a significant difference in bacteriologic conversion at the end of 8 months; 65 per cent of those treated with INH-PAS having converted; 57 per cent of those with SM-INH, and 49 per cent of those with SM-PAS. With reference to triple therapy as compared with the two dual regimens of SM-INH and SM-PAS, the only significant difference appeared to be the rate of bacteriologic conversion at 8 months, which was 85 per cent for those patients treated with all three drugs as compared with 45 per cent for those receiving the dual drug regimen.<sup>1</sup>

At this hospital a group of 96 patients had been treated with all 3 drugs for a period of 8 months. All had at least moderately advanced disease and all had positive sputum at the start of treatment. All patients were receiving treatment initially. Comparison with the previous regimens in terms of roentgenographic improvement, bacteriologic result, and the finding of *Myco. tuberculosis* in the caseonodose residual lesions on smear and tissue strain is shown in tables 1 through 3. The use of all three drugs did not appear to offer any particular advantage.<sup>12</sup>

TABLE 3. *Bacteriologic and pathologic findings in resected specimens from patients who received dual therapy and triple therapy*

	Dual	Triple
Positive for <i>Myco. tuberculosis</i>	69 - 93.2%	30 - 94.0%
Negative for <i>Myco. tuberculosis</i>	5 - 6.8%	2 - 6.0%
Caseonodose lesion	74 - 100%	30 - 94.0%
No caseous nodules found	0 - 0.0%	2 - 6.0%

In further consideration of the problem of INH resistance, a group of 16 patients were treated for 4 months with 300 mg. of INH daily combined with 2 grams of terramycin daily. These patients were selected on the basis of extensive disease with cavitation, so that the probability of their having positive sputum at the end of 4 months was increased. The sputum of 13 of these patients became negative by smear and culture in spite of the fact that only 2 of the 16 showed cavity closure. Of the 3 patients whose sputum remained positive, all were still sensitive to INH so that after 4 months of treatment there were no instances of INH resistance. These results, granted that the number of patients treated was small, contrast strikingly with the results of INH therapy alone for the same period of time.

Previous experience with terramycin as an antituberculosis drug had been reported from this hospital.<sup>13, 14</sup> Because terramycin had been shown to have some degree of antituberculosis activity, both in vitro and in vivo, a group of 66 patients were



treated with 5 grams of terramycin daily in combination with intermittent streptomycin. The roentgenographic response was considered to be most favorable. At 4 months, sputum conversion had occurred in 77 per cent of patients. None of the positive cultures showed streptomycin resistance. Because of the mild, but troublesome gastrointestinal symptoms associated with the use of the 5-gram dose of terramycin, another group of 20 patients were given 2 grams of terramycin daily in combination with streptomycin. The therapeutic response was similar to that seen with the previous series. Sixty-five per cent of the patients obtained bacteriologic conversion. Of the seven patients who remained positive, one had developed resistance to streptomycin.

It would appear from these studies, and from others recorded in the literature,<sup>11,12</sup> that terramycin in combination with streptomycin intermittently is an acceptable and useful drug regimen for the treatment of active pulmonary tuberculosis in situations where the more accepted regimens cannot be used.

*Viomycin* has definite but less antituberculosis activity than streptomycin and is more toxic than streptomycin. Its toxicity, particularly renal, is sufficient to preclude its daily use, but when used on an intermittent combined schedule it has its place in the chemotherapy of tuberculosis, because it is effective against streptomycin-resistant organisms.<sup>13-16</sup> In evaluating the therapeutic efficacy of viomycin at this hospital, it was concluded that, used alone, it did not equal the effectiveness of streptomycin alone, and in a dose of 2 grams every third day approximated the efficacy of daily PAS alone. The combination of viomycin intermittently and PAS daily was more beneficial than either alone, both from the viewpoint of therapeutic response and the development of bacterial resistance. No patient developed persistent resistance to either drug. The combination of viomycin with streptomycin intermittently appeared to be the most effective regimen, approximating the results seen previously with the SM-PAS regimen. However, one patient did develop resistance to 10 µg. of streptomycin at the end of 4 months.<sup>17</sup>

*Pyrazinamide.* More recently pyrazinamide, an analogue of nicotinamide, has come under laboratory and clinical investigation in the treatment of patients with tuberculosis. It was found to be effective in the treatment of tuberculosis in guinea pigs, with a degree of effectiveness, when used alone, somewhere between that of streptomycin and PAS. It was then shown to have a beneficial effect in persons with tuberculosis, whether or not the *Myco. tuberculosis* in the patients were streptomycin-resistant. However, the duration of good response was short-lived and it was presumed that bacterial resistance developed rapidly when the drug was used alone. Unfortunately, it was not

possible to measure the sensitivity of *Myco. tuberculosis* to pyrazinamide by in vitro technic.

Extremely interesting laboratory and clinical studies on the combined use of pyrazinamide and INH have been reported recently.<sup>22</sup> Studies on mouse liver and spleen tuberculosis showed that this combination of drugs produced a much more eradicated effect on the disease than any other drug or combination of drugs. The clinical study by the same authors consisted of 81 patients who were treated with 50 mg. of pyrazinamide per kg. of body weight and 5 mg. of INH per kg. Of this group, 61 patients received pyrazinamide-INH for at least 3 months, with INH continued alone thereafter. Six of these patients (10 per cent) developed evidence of impairment of hepatic function; 4 of whom had jaundice and 3 of whom had severe hepatitis. Two of these last patients recovered, but one died of rapidly progressive hepatitis. Of 55 patients evaluated on the mentioned regimen, conversion of sputum on culture was accomplished and maintained in 90 per cent, substantial roentgenographic improvement occurred in 75 per cent, and cavity closure was observed in 65 per cent of those who had cavities. These results were attained in the first 6 months, with the exception of two patients whose cavity closure occurred later. There were no instances of progression of disease.

The problem of hepatic damage during clinical use of the drug is a frequent one. Of the original 43 patients treated by Yeager and associates<sup>23</sup> with pyrazinamide alone, 2 developed jaundice and had function tests of hepatic insufficiency. Both of these recovered. There were no other serious toxic manifestations. Campagna and associates<sup>24</sup> reported on the treatment of 21 patients with pyrazinamide-INH. Three of these patients developed mild jaundice which lasted for about a week. The liver function tests were not seriously altered in these patients, and the drug was not discontinued because the jaundice disappeared and no definite alterations in the liver function tests occurred. In a study reported by Phillips and co-workers,<sup>25</sup> 29 patients were treated with pyrazinamide. Eleven of these received pyrazinamide alone, and 18 in combination with other agents. One of the patients receiving pyrazinamide alone developed a toxic hepatitis with jaundice, which improved on discontinuation of the pyrazinamide. Of 20 other patients on whom liver function studies were done, five showed evidence of mild hepatic dysfunction as manifested by slightly elevated sulfobromophthalein retention. There were no other instances of clinical hepatitis except for the one mentioned.<sup>25</sup>

Schwartz and Moyer<sup>26</sup> reported their experience at Oteen with pyrazinamide. In a 2½-year experience with 181 patients treated

with pyrazinamide, either alone or together with PAS, streptomycin, or INH, they found it necessary to discontinue treatment in only 2 patients because of mild jaundice, which appeared at 2½ months and 5 months, respectively, of pyrazinamide-INH therapy. They found pyrazinamide-INH to be a very effective regimen in the chemotherapy of pulmonary tuberculosis. It was, in their opinion, at least the equal of any combination of streptomycin, PAS, or INH. In spite of the reported toxicity, the low incidence of jaundice encountered in their series prompted them to make the recommendation that pyrazinamide-INH be used more widely in the treatment of patients with tuberculosis, particularly in streptomycin-resistant cases.

Further studies with pyrazinamide are being carried out in view of its clinical possibilities. McCune and his group<sup>17</sup> have shown in mice that the combinations of pyrazinamide-streptomycin and pyrazinamide-PAS have shown an eradivative effect similar to pyrazinamide-INH. Morse<sup>18</sup> at this hospital has demonstrated a fascinating correlation between degree of INH resistance and pyrazinamide sensitivity. This phenomenon has been collaborated by Middlebrook.<sup>19</sup> A large-scale, controlled study by the U. S. Public Health Service<sup>20</sup> is under way to clarify the nature of the hepatic toxicity of the drug. The results of these studies should prove interesting as they emerge.

**Cycloserine.** The newest drug under investigation is cycloserine, which was reported at the 14th Conference on Chemotherapy of Tuberculosis in February 1955.<sup>21</sup> It is in an early phase of clinical and laboratory investigation so that no definitive statements may be made as to its clinical place. Peculiarly, it does not protect mice or guinea pigs infected with virulent *Myc. tuberculosis*, even though the results reported by Epstein and associates<sup>22</sup> indicated a definite effect in tuberculosis in humans resistant to SM and INH. Given in a dose of 1 gram daily, its most worrisome toxic effect is stimulation of the central nervous system with grand mal convulsions. The critical blood level above which this form of toxicity may occur, appears to be 50 µg. per ml.

### CONCLUSIONS

For practical purposes a number of effective drug regimens are now available to treat pulmonary tuberculosis. Most patients treated at this hospital receive SM-INH intermittently, coupled with pulmonary resection when appropriate. SM-PAS or INH-PAS might be used with as good effect, but with a little higher incidence of drug toxicity or patient intolerance of the PAS. The circumstances under which it might not be elected to use SM-INH would be the presence of long-standing, far-advanced, cavitary disease in which curative surgical intervention would not be

anticipated. Here, it would probably be wise to use INH-PAS or SM-INH-PAS.

In those patients with resistant organisms who need chemotherapy, a number of alternate regimens have been suggested. The regimen to be chosen would depend upon a number of factors, especially the nature of organism resistance and drug availability.

Newer drugs are under investigation and it may be that still more effective drugs or combinations will be found in the near future.

Concepts have changed rapidly during the past few years, and they will probably continue to change, so that what may seem true now may appear quite antiquated in a short time. For example, it was proposed in the introduction that starting SM-PAS intermittently early is advantageous to the patient. This is true at present, knowing the method of treatment on which the patient will be continued to completion of his hospital care. But it may not be true next year, for it is not beyond conception that fundamental research may show that such treatment is inadequate, and inadequate treatment may allow the *Myco. tuberculosis* to adapt to its new environment.

Regardless of such speculation, however, the drugs available are powerful weapons against tuberculosis and used properly serve to reduce immeasurably the morbidity and mortality of the disease.

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### SURGICAL WISHFUL THINKING

The diagnosis and definitive treatment of the cancer patient is, on the whole, the most responsible function of the surgeon. Cancer is one of the only diseases the surgeon is called upon to treat which is essentially 100 percent fatal untreated. If recurrence and death from cancer were immediate and dramatic, our sense of personal responsibility would be kept taut, but the time lag in the disease allows slackening, so that too often the surgeon takes the line of least resistance from the beginning, instead of the line of *most* resistance. The serious treatment and evaluation of cancer patients is a grim business, and not too many men are willing to do the follow-up in other than a casual fashion. Personal experience is an enlightening one, and much more salutary than reading someone else's statistics. Extrapolation of results, because of comparable surgical mortality rates, into the statistical salvage rates of leading clinical centers where serious study of the disease is carried out, is surgical wishful thinking.

—DANELY P. SLAUGHTER  
in *Surgery, Gynecology and Obstetrics*  
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# EFFECT OF DELAYED WARMING ON EXPERIMENTAL FROSTBITE

ROBERT B. LEWIS, *Colonel, USAF (MC)*

CARL G. HOAK, *Captain, USAF (MC)*

**A** NUMBER of investigators<sup>1-7</sup> have reported that immediate rapid thawing of frostbitten parts in experimental animals resulted in less gangrene than in controls spontaneously thawed in air.

The question arises whether rewarming must be performed immediately while the part is still frozen to obtain benefit, or if it can be delayed until after thawing has occurred.

This investigation was performed to determine the effect on the incidence and extent of cutaneous gangrene in frostbitten rabbit legs when rapid warming was delayed for various periods of time.

## MATERIALS AND METHODS

The experiments were performed on 351 male albino rabbits of 2,000 to 2,500 grams body weight; 159 served as controls and 192 were treated. The animals were given a standard diet (Purina pellets) and allowed water *ad libitum* throughout the experimental periods. Freezing and thawing procedures were conducted in an air-conditioned room in which the temperature was kept constant during each experiment; the temperature varied day to day from 25° to 28°C.

Eleven separate experiments with adequate controls were performed. In five, rapid warming was delayed 30 minutes after freezing; in three the delay was 1 hour; in two, 2 hours; and in one, 4 hours.

One hind leg of each animal was prepared for freezing as follows: The hair was removed from mid thigh to foot the day before the experiments by clipping followed by the application of a depilatory cream. Immediately prior to freezing, the depilated legs were covered with a thin layer of wool fat followed with rubber condom boots. The boots were secured at the ankle with narrow strips of adhesive tape following which air was milked

From U. S. Air Force School of Aviation Medicine, Randolph Air Force Base, Tex.  
Col. Lewis is now assigned to Detachment 2, 7520th U. S. Air Force Hospital, Box, 64,  
Hart 100, FPO, New York, N. Y.

out of the boot to obviate air pockets which would alter thermal conductivity. The top of the boot was then fixed to the lower thigh by means of circularly placed adhesive tape and a pencil mark was made at the lower tip of the femur to designate the depth of immersion in the freezing bath. The freezing bath consisted of a tank of ethyl alcohol-dry ice mixture, which was kept in constant motion by means of electric stirrers. The temperature of the bath was not allowed to vary more than  $0.5^{\circ}\text{C}$  during the exposure times.

In all experiments, the exposure time was 30 minutes. The temperature varied from  $-15^{\circ}$  to  $-18^{\circ}\text{C}$  in different experiments to produce varying degrees of skin injury. The animals were anesthetized with Pentothal Sodium (brand of thiopental sodium) during cold exposure.

Rapid warming was accomplished by immersing the cold-injured legs in warm water at a temperature of  $42^{\circ}\text{C}$  for 5 to 8 minutes.

After warming, the injured legs were dressed with Sulfamylon ointment (brand of mafenide (4-aminoethylbenzenesulfonamide HCl)) and gauze. The dressings were changed daily until the end of the experimental periods, which varied from 6 to 9 days in different experiments. The rabbits were then sacrificed, and the incidence and extent of skin necrosis were determined. The technic for quantitative measurement of skin gangrene has been described in another article.\* Animals which died close to the end of the experimental periods with sharply demarcated areas of necrosis were included in the evaluations.

The statistical analysis of the results was performed as follows: For each experiment the Mann-Whitney nonparametric test was used to evaluate the difference in areas of skin necrosis between treated and control animals. From the individual P values obtained, a combined P value was computed for each specific rapid-warming delay time.

Modified "t" tests were used to determine the significance of differences in incidence of skin gangrene between treated and control animals.

## RESULTS

The results are summarized in table 1. In experiments (I-V) in which rapid warming was delayed for 30 minutes, the extent and incidence of skin gangrene were significantly less than in controls spontaneously warmed in air ( $P > .01$  and  $P > .003$ , respectively).

When the rapid warming was delayed for 1, 2, or 4 hours (experiments VI-XI), the results did not show statistically signifi-



TABLE 1. *Effect of delayed rapid warming on skin necrosis in rabbits following cold exposure for 30 minutes*

Experiment number	Time between freezing and rapid warming	Exposure temperature ( $^{\circ}\text{C}$ )	Number of animals			Average skin necrosis (sq cm)	Number with skin necrosis	Survival time (days)*
			Exposed	Died	Evaluated			
I	30 min	-16	T 16	1	15	$7.8 \pm 2.1$ $27.0 \pm 3.5$	12	7
			C 15	0	15		14	
II	30 min	-15	T 17	0	17	$2.2 \pm 1.8$ $7.0 \pm 2.4$	5	7
			C 17	0	17		9	
III	30 min	-15	T 20	9	11	$30.8 \pm 1.9$ $55.3 \pm 9.6$	11	8
			C 20	15	5		5	
IV	30 min	-15	T 20	4	17**	$7.9 \pm 2.5$ $25.8 \pm 4.0$	14	8
			C 20	5	15		14	
V	30 min	-15	T 23	7	16	$14.4 \pm 3.8$ $26.2 \pm 4.5$	10	9
			C 22	10	13**		12	
VI	1 hr	-18	T 15	1	15**	$21.9 \pm 3.6$ $35.3 \pm 4.0$	14	7
			C 15	2	13		13	
VII	1 hr	-16	T 16	0	16	$15.8 \pm 2.4$ $15.0 \pm 2.6$	15	7
			C 18	1	17		14	

TABLE 1. *Effect of delayed rapid warming on skin necrosis in rabbits following cold exposure for 30 minutes—Continued*

Experiment number	Time between freezing and rapid warming	Exposure temperature (°C)	Number of animals			Average skin necrosis (sq cm)	Number with skin necrosis	Survival time (days)*
			Exposed	Died	Evaluated			
VIII	1 hr	-16	T 16	3	14**	22.9 ± 5.0	10	7
			C 15	0	15	22.0 ± 3.5	14	
IX	2 hr	-16	T 16	0	16	16.3 ± 3.0	14	7
			C 18	1	17	15.0 ± 2.6	14	
X	2 hr	-17	T 16	0	16	27.3 ± 2.3	16	6
			C 14	0	14	33.1 ± 2.1	14	
XI	4 hr	-17	T 17	1	17**	29.7 ± 2.6	17	6
			C 14	0	14	33.1 ± 2.1	14	

T = treated animals; C = control animals.

\*All animals were sacrificed.

•Animals which died near the end of the experimental period with well demarcated areas of necrosis were evaluated. Experiments I and VIII were performed on the same day using the same control animals.

This was true also for experiments X and XI.

cant improvement with regard to either the incidence or extent of skin necrosis when compared with controls.

In three experiments (VI, VII, and VIII) in which warming in water was delayed one hour, one showed a statistically non-significant decrease in the extent of gangrene in treated animals and in the other two the treated and control animals behaved almost identically. For all three, the combined  $P$  value was about 0.30. The  $P$  value for the difference in the incidence of gangrene between treated animals and controls for the three groups was 0.4.

Experiments in which rapid warming was delayed two hours (IX and X) gave results for which the computed combined  $P$  value for the difference in extent and incidence of gangrene was 0.2 and 0.7, respectively.

Delay of rapid warming for four hours in one experiment (XI) resulted in an incidence of gangrene of 100 per cent in both treated and control animals and the extent of gangrene was almost the same in the two groups ( $P = 0.3$ ).

The observation that the death rate and extent of cutaneous gangrene varied considerably in different experiments, conducted under the same conditions but on different days, is not explainable but has been noted many times by the authors in past experiments with cold injury.

### DISCUSSION

The results of the present investigation indicate that skin necrosis can be decreased when the rewarming procedure is delayed as long as 30 minutes. Delay of one hour or longer failed to prove beneficial in these experiments, although Entin and Baxter<sup>4</sup> reported decreased gangrene after immersing frozen rats' feet in warm water following delay up to one hour after freezing. In their experiments, waiting 2 and 3 hours to rapidly warm gave results which were not better than in controls thawed in air.

It is reasonable to assume that the same results would be obtained from delayed warming of cold-injured parts in man.

Entin and Baxter found that 6 to 10 minutes were required to air-thaw rats' legs following exposure to a bath at  $-30^{\circ}\text{C}$  for 12 to 30 seconds, but the original tissue temperature was not attained until 40 to 60 minutes had elapsed. In our own experience,<sup>5</sup> deep leg temperatures in rabbits remained subnormal for 2 hours or longer after 30 minutes' exposure to freezing or even non-freezing cold baths.

These observations indicate that damage to tissues is produced not only during the time of solidification from cold, but that the

injurious process continues until tissue temperatures approach normal. Such a conclusion should not be surprising when one realizes that above-freezing cold can cause gangrene and less severe pathologic changes in both humans and experimental animals in so-called "trench foot" and "immersion foot or leg."

It, therefore, would seem to be of considerable practical importance not only to rapidly thaw frozen parts but also to continue the warming until the parts reach normal body temperature. Care must be taken, however, not to overheat the injured tissues, causing burn injury. Relatively mild degrees of overheating have been shown to produce tissue changes in rabbit legs.<sup>10</sup>

Furthermore, it would also seem important that rapid warming be instituted even after cold-injured parts have thawed, because one cannot always be certain that the cold intensity or exposure time or both have been sufficiently great to preclude the saving of tissue.

It is apparent that, other things being equal, the benefit obtained from rapid warming will vary indirectly with the length of time the tissue is exposed to cold, either in the cooled or frozen state.

The manner by which rapid thawing of parts frozen by relatively short exposure to cold produces improvement is not known. It would seem that the lessening of the exposure time to cold by the application of heat is the main and perhaps the entire reason for benefit.

### SUMMARY AND CONCLUSIONS

In five experiments, frozen rabbit legs thawed in air at room temperature for 30 minutes, and then rapidly warmed for 5 to 8 minutes in warm water (42°C), developed significantly less gangrene than controls similarly frozen but thawed only in air. Benefit was not obtained when the rapid warming in water was delayed for 1, 2, or 4 hours after freezing. These observations indicate that damage occurs not only while the parts are frozen but also during the post-thaw period before the tissue temperatures reach normal.

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### OPEN TREATMENT OF BURNS

The aim in severe burns is to protect the burned area against infection, to prevent loss of fluids and absorption of toxins, and to avert loss of function and production of deformity. Treatment must be instituted promptly and burns given the same priority demanded by any serious emergency. Many investigators stress the treatment of the general condition, which is important, but it is imperative to remember that the local condition is the primary aggravating factor. It has been found that duration of illness and mortality in burn cases are considerably reduced when treatment is under unified control. There are many important advantages to the open method of treatment: greater ease of dressing than in some methods; no anesthetic necessary for dressings; debridement facilitated; constant wound evaluation, so that grafting can be done at the optimum time; active and passive motion can be started early, and drainage is promoted.

—G. KENNETH LEWIS, M. D.  
in *Postgraduate Medicine*  
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# POTENTIAL REVERSIBILITY OF THE HEMIPLEGIC GAIT

WALTER J. TREANOR, *Captain, MC, USA*  
ROBERT B. PEARSON, *Captain, MC, USA*  
RAOUL C. PSAKI, *Lieutenant Colonel, MC, USA*  
ERNST DEHNE, *Lieutenant Colonel, MC, USA*

**D**ESPITE an increased interest in the rehabilitation of patients with spastic hemiplegia, there is no objective evidence that significant improvements in technics of muscle retraining have resulted. Walshe's<sup>1</sup> description of spontaneous recovery to the level of an extensor leg still seems to be an adequate portrayal of the end result of present retraining methods. In obvious contrast have been the steady advances in the convalescent care of patients with paralytic poliomyelitis. It seems to us that many of the more recent improvements in poliomyelitis care have resulted from Bennett's<sup>2</sup> analytic approach. His inquiries into the dangers of precipitate ambulation and his insistence on attention to small details in therapy have contributed greatly to the reduction of deformities and to the restoration of improved functional abilities. Inherent in the Warm Springs philosophy is this emphasis on careful observation and attention to small details.

In an effort to apply some of these principles to the management of patients with spastic hemiparesis, we have followed the pattern of motor recovery in a series of 125 patients, and have observed the influence of various physical therapy procedures on this pattern. Each of these patients has been examined repeatedly throughout the cycle of recovery by one of us (WJT). This series represents a consecutive sample of patients referred to the physical medicine service of this hospital. It needs to be emphasized that this study was performed under ideal conditions, particularly in respect to the co-operation received from our colleagues in internal medicine, orthopedics, and neurosurgery.

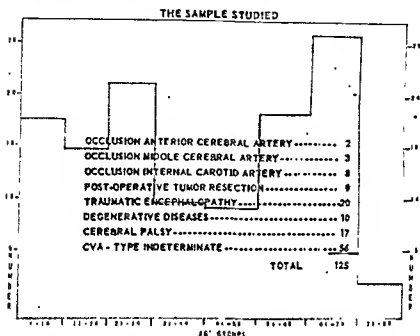
## MATERIAL

Of the 125 patients studied, 83 were males and 42 were females. In age, these patients ranged from 4 to 80 years, with a distribution spectrum as shown in table 1. It is apparent from

From Letterman Army Hospital, San Francisco, Calif. Dr. Treanor is now at St. Mary's Hospital, San Francisco, Calif.

this figure that the sample is weighted nearer the median age group than a series from a civilian hospital would be. Spastic hemiparesis occurred in 63 patients who were under 30 years of age, and from this group came a high proportion of the patients who showed maximal motor recovery.

TABLE 1. *Distribution of 125 hemiplegic patients by age and causative factors*



The causative factors productive of hemiparesis are also summarized in table 1. As is more or less inevitable, cerebrovascular accidents of unknown causation and uncertain location were numerically the most significant. However, the increasing employment of angiography as a diagnostic aid was reflected in the location of the vascular disease in 13 patients. Recovery in two of the patients with occlusion of the middle cerebral artery has already been described in detail in an article by Rosegay and Welsh.<sup>3</sup> Angiograms revealed that thromboses adjacent to the carotid syphon were productive of hemiparesis in eight patients. That this relatively new syndrome should have been recognized so frequently in this small series of patients was due to our neurosurgical colleagues' keen awareness of the syndrome. Thrombosis at this site occurred spontaneously in seven patients and followed trauma in one other patient. Cortical damage, localized chiefly in the frontal and parietal lobes, was the result of missile entry in 12 patients and of concussion following auto-

mobile accidents in eight others. Classified as having degenerative disease were seven patients whose referral diagnosis was multiple sclerosis, and three others with the diagnosis of amyotrophic lateral sclerosis. Deliberately, we selected only those cerebral palsied children in whom the signs of an upper motor neuron deficit were confined to one side of the body. Employment of this criterion necessitated the exclusion from this report of a large number of children with spastic triplegia (in our experience, the commonest form of cerebral palsy).

From study of the levels of motor recovery which these patients achieved, we attempted to find answers to two large questions. First, we sought to define the individual components of the hemiplegic gait. Second, we sought to determine what forms of physical therapy influenced the gross appearance of this gait.

### THE HEMIPLEGIC GAIT

#### *Postural hypertonus*

Expressed in Jackson's<sup>4</sup> terms of a dissolution of higher functions, the hemiplegic gait can be described as "evolution not being entirely reversed, some level of evolution is left." Motor recovery occurs in a highly selective fashion, appearing earliest in the "prop muscles" of the leg, namely the extensors of the knee and ankle. Conversely, there is a relative hypotonia in the antagonistic flexors of the knee and dorsiflexors of the foot. Evidence of hyperactive postural muscle groups was found in all but 2 of the 125 patients in this series. It was seen earliest and persisted longest in those patients who were ambulated early. Clinically, it was reflected in the contrast between the patients' ability to extend the knee strongly through a wide arc of movement and their inability to flex the knee when in the prone position. There was also an obvious imbalance between strongly contracting plantar flexors and paretic dorsiflexors of the foot. Seventy-nine of these patients held the foot in a position of equinovarus, and four patients exhibited a persistent position of equinovalgus. More rapid restitution of motion in the flexor groups was seen in but two patients, both of whom had been confined to strict bed rest by reason of concomitant systemic diseases.

#### *"Lateral leg" asynergia*

A phenomenon of delayed return in the laterally placed muscles of the lower extremity was observed in the great majority of patients. As a result of this, there was gross impairment of synergic contraction of the internal rotators of the hip, of the biceps femoris, and of the muscles producing the movement of dorsiflexion in eversion (fig. 1). Restoration of this total synergy was observed in only 23 patients. It was our opinion that this dys-



synergia was a major factor in the causation of the dysmetria which was observed in almost all patients, as performance of the heel-knee test was seen to improve concurrently with correction of the imbalance between internal and external rotators of the hip. Likewise, we found that restitution of the movement of dorsiflexion in eversion was by far the most reliable indication of advanced functional return about the foot.



*Figure 1. Patient with lateral leg asymmetry. There is a decrement in performance of hip internal rotation and of foot dorsiflexion on the right side.*

#### *Delayed return in proximal muscles*

Persistent weakness in proximal muscle groups was seen in all patients. This phenomenon could be observed critically only in those patients who had recovered spontaneously to a considerable degree, because in more severely involved patients the obvious weakness in proximal groups could not be studied sepa-

ately from generalized weakness throughout the limb. Gross evidence of weakness in proximal muscles was seen in the persistence of a Trendelenburg limp until very late in recovery, and in the poor performance of the movement of abduction at the hip joint (fig. 2). Satisfactory volitional control of hip flexion was observed only following corrections of the imbalances between the rotator muscles and between the abductor and adductor groups. Clinically satisfactory function of the hip musculature occurred only when there was restitution of considerable voluntary power in the *gluteus medius*. A rating of normalcy was given



Figure 2. Patient with proximal paresis. Note diminished range of abduction on the right side.

when no decrement, in either range or strength, could be detected in the performance of the movements of hip abduction and of internal rotation.

#### *Genu recurvatum*

The occurrence of an apparent genu recurvatum in 47 patients could not be explained on the basis of any, or all, of the foregoing observations (fig. 3). A frequent finding in these patients with genu recurvatum was their inability to extend the leg com-



*Figure 3. Patient with genu recurvatum.*

pletely at the knee, especially when the hip joint had previously been placed in flexion. Likewise, they were observed to perform the movement of knee extension more slowly, and in a less rhythmical manner, on the paretic side. Incriminated in the production of genu recurvatum were paresis of the vastus medialis and the rectus femoris, and over-activity of the gastrocnemius muscles. The presence of "backknee" was usually made clinically more pronounced when patients attempted to walk on their heels. It was our experience that this deformity was persistent, and even progressive, unless preventive or corrective measures were adopted.

## ALTERING THE HEMIPLEGIC GAIT

*Rigid control of ambulation*

Ambulation with the limb suitably splinted was encouraged throughout the stage of initial generalized hypotonia and until the extensor muscles were able to support the body weight. However, ambulation was severely curtailed throughout most of the remainder of the recovery cycle, certainly until a balance between the strength of flexor and extensor activity had been achieved. Our reasons for attempting this radical departure from usual treatment methods have been outlined in a previous report.<sup>5</sup> In a special study group of 21 patients, it was very obvious to us that this policy was the most important factor in shortening the time needed for recovery of the flexor synergy. During this phase of curtailed ambulation there was no slackening in the tempo of nonweight-bearing resistance exercises directed specifically toward retraining of the flexor groups. Ambulation was permitted when it appeared that the flexor muscles had recovered sufficient strength to permit their competing successfully with the opposing extensor muscles. As a rule, this condition was satisfied when the patient could, during stance, flex the knee fully without any concomitant flexion at the hip.

*Selective re-education*

In keeping with the policy of reducing afferent stimuli to the postural muscles, emphasis was given to retraining of the flexor synergy. At first, painful stimuli were combined with manual resistance to reinforce the response of synergic withdrawal in all the flexors. Later, re-education exercises were prescribed for individual flexor muscles of the knee, foot, and hip joints in that sequence. Particular care was given to the restitution, by resistance exercises, of strength in the biceps femoris and the long extensors of the toes. Prior positioning of the thigh in internal rotation was also found helpful in increasing the amplitude of contraction in these muscles.

Retraining of motion about the hip was also undertaken in a selective fashion. Initially, hip abduction was reinforced by simultaneous spine extension and by traction on the leg. Insistence on bilateral contractions, performed in a prone position, obviated much of the danger arising from the performance of hip abduction by muscles extrinsic to the hip joint. The tendency of patients to perform hip flexion with the femur held in external rotation also had to be guarded against. For this reason, resistance was applied to contracting hip flexors with the femur held in a position of moderate internal rotation. Retraining of the movement of hip extension was attempted several weeks after the movements of hip flexion and abduction.

It appeared to us that the usual routine of resistance exercises for strengthening of knee extensor muscles did not materially increase the patients' ability to perform terminal extension. Because this deficit persisted until the last stages of recovery, no attempt at early correction was made. During re-education of this movement, weight-bearing was again temporarily curtailed, extension was performed in a gravity-eliminated position, and was attempted initially only through a small arc of motion. In the majority of patients, increments in range and strength occurred *pari passu* with increases in the bulk of the vastus medialis. During this phase of re-education, protection was provided for the knee joint by the application either of a long leg brace with an "offset" joint or of a "knee cage."

### *Chemical nerve blocks*

To permit more accurate assessment of residual strength in relatively hypotonic groups, we have employed, with increasing frequency, a technic of blocking conduction in the nerve trunk supplying the stronger antagonistic extensor muscles. This procedure has been of inestimable value in determining the rehabilitation potential of individual patients, and also as a guide to the potential benefits of surgical interruption of these nerves. Because we experienced considerable difficulty in isolating peripheral nerves when using standard methods of infiltration with an anesthetic agent, an adaptation of a technic described by Sarnoff and Sarnoff<sup>10</sup> was devised by one of us (RBP). A square wave pulse, whose characteristics are depicted in figure 4, was applied to the uncoated tip of an otherwise insulated hypodermic needle. Using variable voltages, it was possible to approximate the needle tip to the nerve by observation of the strength of response in the muscles supplied by the stimulated nerve. As the needle tip became more closely applied to the nerve, steadily diminishing voltages were required to produce a motor response. When a pulse of from 0.5 to 1.0 volt produced a perceptible contraction in the muscle, the local anesthetic, a 1 per cent solution of xylocaine (brand of lidocaine hydrochloride), was injected (fig. 4).

With this method of approximating the needle-tip to the nerve, as little as 5 ml. of the anesthetic agent has been sufficient for complete conduction block in even the largest peripheral nerve trunks. We were even able to confirm the fact of intraneural placement of the needle in some of the operated patients. Following complete block, a fresh assessment of the function of the previously hypotonic "unblocked" muscle group was undertaken. If increased volitional contraction was observed, we felt justified in continuing a program of muscle retraining directed specifically toward retraining this group. If, even following the

application of an adequate "reinforcing" stimulus for this group, there was no worthwhile improvement in contraction following block, we presumed that there had been long-standing "decay" of this function, and that prolonged and expensive retraining could not be justified. This technic of conduction block was also found useful as a means for determining whether extensor over-activity at either the knee or the ankle was primarily incriminated in the production of the hemiplegic gait.

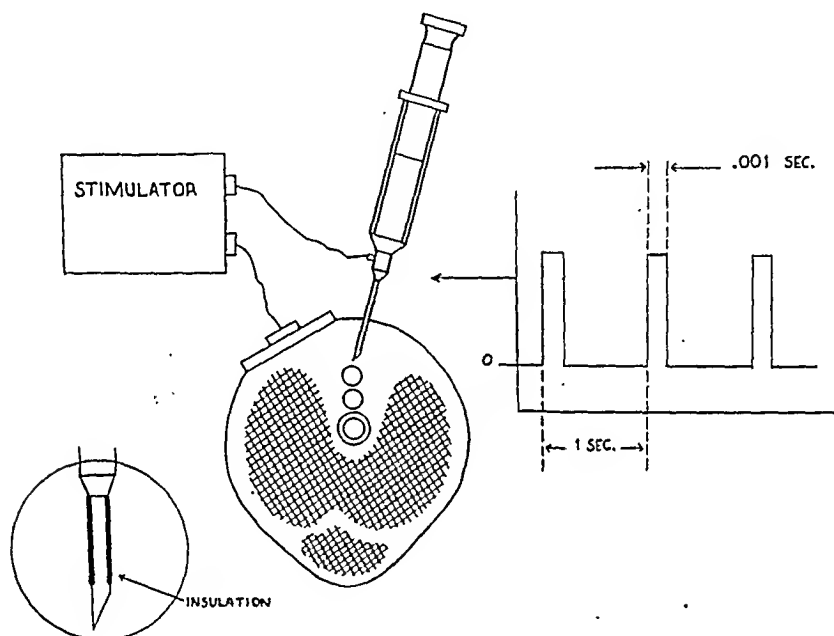


Figure 4. The nerve stimulator.

#### *Surgical interruption of nerve conduction*

When a satisfactory increment in the strength of the flexor muscles was observed to follow anesthetic block of the nerve to their antagonists, the possibility of surgical neurotripsy was considered. To date, a total of 29 such operations have been performed. Statistical analysis of the results of these procedures is being undertaken and will be presented in subsequent communications. Following surgical neurotripsy, intensive re-education of the flexor groups (in our hands, chiefly the dorsiflexor muscles of the foot and the flexors of the knee) became easier to perform and more enduring in its benefits. Also, after reduction or elimination of the strong plantar thrust and clonus at the ankle, braces could be either dispensed with entirely or greatly reduced in

weight. Furthermore, in three patients there was a gratifying reduction in the amount of "backknee" after crushing of the tibial nerve branches to the overactive posterior calf muscles. Neurotomy, or interruption of conduction by the application of pressure to the nerve, and, in three patients, transection and immediate suturing were chosen in preference to extirpation neurectomy because of the reversibility of the block by the former means. The branches to the muscles were identified with the aid of a stimulator and were crushed at the furthest possible distance from the point of their entry into muscle (fig. 5).



*Figure 5. Roentgenogram showing tantalum markers placed at site of interruption and at entrance of nerves into muscles.*

We have not attempted blocking of conduction by alcohol injections because of the disadvantages of topical anesthesia produced by such blocks. Actually, surgical interruption was chosen because we were chiefly interested in the reduction of proprioceptive impulses from hyperactive muscle groups. It has

been amply illustrated that fibers carrying these impulses are as susceptible to mechanical blocking as the large diameter "motor" A fibers. The only difficulties we encountered following operation were wound infections in three patients and a too early return of function in two other patients because of insufficient pressure.

### DISCUSSION

Van Buskirk<sup>6</sup> recently described his observations on the mosaic of motor recovery in hemiplegia, particularly "as related to the learning of simple motor activity." The present study could be described in similar terms. Spontaneous recovery, occurring within the first 2 to 3 months following onset, accounted for most of the functional gains in our experience also. It was apparent, however, that the extent and rate of spontaneous recovery could be significantly altered by more careful control of afferent influences acting on spinal integrator systems. Limitation of standing and selective retraining of flexor activity were seen to result in an earlier restitution of the gross flexor synergy and of volitional control over individual flexor muscles. Expressed in Knowlton's<sup>9</sup> terms, temporary "decay in certain existing patterns" of extensor activity was sought, in order to prevent later permanent "decay" of opposing flexion. Similarly, the practice of blocking nerves by chemical or mechanical means was designed to lessen the danger that the weaker muscle might be "ignored" in the performance of motion patterns.

This type of retraining program was based on two physiologic hypotheses. First, our observations on spontaneous recovery convinced us of the validity of Sherrington's<sup>10</sup> concept of selective synaptic resistance. Thus, it was apparent that most afferent impulses were relayed with much greater facility to motoneurons controlling extensor muscles. In the state of increased central excitation prevailing following reduction in descending inhibitory relays, minor stimuli were seen to evoke disproportionate motor responses in these extensor groups. Conversely, it was always found difficult to produce an adequate afferent stimulus for activation of flexor motoneurons.

Second, there was ample evidence in this study of the existence of opposing half-centers in the spinal cord, that is, of an arrangement of motoneurons into antagonistic flexor and extensor groups. Following chemical conduction blocks, we observed certain alterations in strength of muscular contraction which could most readily be explained on the basis of this theory of half-centers. The decrements in quadriceps contraction which followed obturator and tibial nerve blocks led us to the conclusion that proprioceptive feed-back from the plantar flexors of the foot, from the knee extensors, and from hip adductor muscles



were all relayed to a common extensor (postural) motoneuron pool. Because the express purpose of surgical intervention was the reduction of a known amount of afferent return from these muscle groups, nerve operations were preferred to procedures on the end-organ, such as tendon lengthening.

These observations do not allow a conclusion, such as Foerster<sup>11</sup> made 40 years ago, that the factors influencing the pattern of recovery were entirely external. Neither do they support Walshe's<sup>12</sup> contention that the incidence of spasticity, and hence the attitude of the limbs, are determined almost completely by internal factors. It appears to us that too little attention has been paid to the control of external afferent influences, particularly those arising from receptors in antigravity muscles. The hypothesis of a potential reversibility of the hemiplegic gait is based on the alterations in performance that we have observed to result from an increased attention to the role of such afferent influences.

### SUMMARY

The individual components of the hemiplegic gait have been analyzed and described under the headings of postural hypertonus, asynergia of laterally placed muscles, delayed return of proximal groups, and genu recurvatum. Among the measures suggested for improvement of the gait have been limitation of ambulation, selective retraining of flexor muscles, and chemical and mechanical blocking of the nerves supplying the extensor groups. The hypothesis of potential reversibility is based on observations made on the patterns of motor recovery in a series of 125 patients. It was supported by improvements in the extent and speed of recovery which followed closer attention to the control of proprioceptive afferent stimuli.

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### LACK OF JUDGMENT CAN BE LETHAL

It is a surgical truism that few patients are killed by lack of technic, whereas lack of judgment has often been lethal. Perhaps the most dangerous surgeon is the one with facility and so-called courage who lacks judgment. Today's surgical training programs are often evaluated only by the number and variety of cases done by the residents. Indications and judgments exhibited are frequently neglected. How much more revealing would be a listing of patients spared surgery after proper observation and precise etiologic diagnosis. Narrow specialized training programs in the surgical subspecialties, without the requirements of basic general surgical background, have produced many skillfully trained specialty technicians who are at a loss when confronted with general surgical problems, as they might well be in smaller communities.

—LEON G. BERMAN, M. D.  
in *New York State Journal of Medicine*  
p. 3425, Dec. 15, 1954

# THE WECHSLER-BELLEVUE SCALE IN CLINICAL DIAGNOSIS

## Some Aspects of Its Use in Clinical Diagnosis

ALEXANDER TOLOR, *Second Lieutenant, USAF (MSC)*

THE PRIMARY purpose in administering any intelligence scale, obviously, is to arrive at a valid measure of an individual's level of intellectual functioning. In the past, however, as the intimate relationship existing between intelligence and personality gained increasing recognition, psychologists began to devote more attention to the manner in which various patterns on intelligence tests could be used in gaining new insights about the patient's personality. Accompanying this trend there has also been a resurgence of interest in intelligence tests with a view toward discovering the type of strengths and weaknesses which patients suffering from organic brain disease characteristically display.

One of the intelligence scales which has been found most suitable and therefore has been used most frequently for differential diagnostic purposes is the Wechsler-Bellevue Scale. This instrument lends itself readily to various types of analyses as it includes a number of verbal tests and a number of performance tests, yielding two separate quotients. Furthermore, the relationships between the scores on the various subtests can be analyzed so that any patterns, if there are such, which are characteristic of the different diagnostic groups can be ascertained.

The most obviously useful feature of the Wechsler-Bellevue Scale is its division into verbal and performance sections. There is a belief widely held among clinicians that the difference between verbal and performance sections, especially if large, is of diagnostic significance. Wechsler<sup>1</sup> himself contends: "... the general finding is that in most mental disorders impairment of functioning is greater in the performance than in the verbal sphere." He proceeds to explain that this conclusion applies to patients with psychosis or organic brain disease and to most psychoneurotics.

The more sophisticated methods of test analysis involve an examination of subtest scores. One commonly employed technic for differentiating between patients with cerebral lesions and

From U. S. Air Force Hospital, Parks Air Force Base, Calif.

those with psychoneurosis is Hewson's<sup>2</sup> pattern of deviation ratios. In applying this method, one computes a series of ratios by comparing certain of the Wechsler-Bellevue weighted subtest scores with certain others. Hewson has demonstrated on an empirical basis that these ratio scores discriminate between the two groups fairly accurately. Depending on the resulting ratios, one can conclude that the distribution resembles that frequently obtained in association with a cerebral abnormality, an emotional disturbance, or with neither of these.

### PURPOSE

The present investigation had a fourfold purpose. First, I wished to ascertain whether the organic, convulsive, and psychogenic groups differed in intelligence on the full, verbal, or performance scales of the Wechsler-Bellevue. Second, it was intended to establish whether large discrepancies between ratings on verbal and performance sections on the Wechsler-Bellevue Scale discriminated among patients of the three groups. The third aim was to evaluate the usefulness of the Hewson method with these patients. Finally, I wished to determine whether the level of accuracy in making differentiations is greater when psychologic impressions are based on a whole battery of tests or when they are based only on the Wechsler-Bellevue Scale.

### METHOD AND SUBJECTS

All the patients used in the present study were referred to the psychology department of Neurological Institute, Columbia-Presbyterian Medical Center, New York, N. Y. In many cases organic brain damage was suspected by the referring neuropsychiatrist, but there was often considerable doubt about the most probable diagnosis. A variety of laboratory procedures, including roentgenograms of the skull, electroencephalograms, pneumoencephalograms, et cetera, were usually performed. The psychologic tests were administered and interpreted by qualified psychologists. A typical battery of tests included the Wechsler-Bellevue Scale, Form 1, the Substitution Test, the Bender-Gestalt Test, projective drawings, and the Rorschach Test. There was considerable flexibility in choice of tests, and occasionally additional instruments such as the Thematic Apperception Test were employed.

The data with which this report concerns itself were collected independently and prior to knowledge of the patients' discharge diagnoses. The latter were made by members of the medical staff who used all the pertinent information at their disposal. It should be emphasized that the psychologists' impressions concerning the presence or absence of organicity were based solely on their observation of patients and their interpretation of test results.

Table 1 contains information pertaining to the distribution of the three groups by age, sex, and intelligence. It will be noted that there are large age and sex differences in these groups. However, since there is no reason to believe that differences in sex have any significant effect on the dependent variables, no attempt was made to equate for sex.\* As for the age differences, which are in all cases significant at the 1 per cent level of confidence, the methods used in computing Wechsler-Bellevue quotients and Hewson ratios in effect make allowance for age differences.

TABLE 1. *Composition of the three groups*

	Group		
	Organic (N = 91)	Convulsive (N = 35)	Psychogenic (N = 49)
Sex			
Male	57	14	23
Female	34	21	26
Age			
Range	12-72	12-56	12-64
Mean	44.1	27.6	35.4
S. D.*	15.1	11.9	14.2
W-B total I. Q.			
Range	54-129	61-121	79-136
Mean	90.8	94.2	110.8
S. D.	16.7	15.4	13.1

\*Standard deviation

The organic group is composed of 91 patients, all having some type of intracranial abnormality. Although efforts at classification were difficult and at best unsatisfactory, the following broad and arbitrary subgroups may be distinguished:

23 with brain tumors (11 proved histologically)

16 with vascular lesions (including aneurysms, subarachnoid hemorrhages, arteriosclerotic disease, and encephalomalacia)

4 with infectious diseases (syphilis and oncephalitis)

15 with head trauma (all types including surgical)

27 with degenerative diseases of the brain (including presenile dementias, multiple sclerosis, and various unspecified degenerative diseases)

\*Furthermore, the composition of the groups with respect to sex is not significantly different when the organic group is compared by  $\chi$  test to the functional group or when the convulsive group is compared to the functional group. The difference between the organic and convulsive groups is, however, significant at the 5 per cent level.

6 with hereditary degenerative diseases (Huntington's chorea)

The patients falling in the class of psychogenic disorders received a variety of discharge diagnoses which often specified a particular neurosis but at times reflected the somatic concomitants affecting other systems. Of the 49 patients comprising this group, only 3 were diagnosed as being psychotic, and these were probably in partial remission. Thus, the findings cannot be generalized to psychotic patients and should more appropriately be restricted to the less severe personality disorders.

The 35 patients in the convulsive group qualified for inclusion if their seizures, irrespective of whether they were petit mal, grand mal, or psychomotor in type, were of undetermined cause. This group, therefore, refers only to patients having idiopathic seizures.

### RESULTS

Inspection of table 2 reveals that the patients in the organic group differed significantly from those in the functional group with respect to mean I. Q.'s obtained on the over-all Wechsler-Bellevue Scale, on the verbal scale, and on the performance scale. The differences in each case were in favor of the psycho-

TABLE 2. Mean I. Q. and critical ratios for the groups on Wechsler-Bellevue Scales

Groups	Full scale	Verbal scale	Performance scale
Organic	90.76	92.13	92.12
Convulsive	94.23	95.43	93.97
Psychogenic	110.82	108.31	111.82
Organic vs. psychogenic C. R.* P**	7.51 <.01	6.30 <.01	7.70 <.01
Convulsive vs. psychogenic C. R. P	5.17 <.01	4.25 <.01	2.75 <.01
Organic vs. convulsive C. R. P	1.11 1.***	1.15 1.	.55 1.

\*Critical ratio

\*\*Probability

\*\*\*Insignificant

genic population. The same level of significance applies to a comparison of the convulsive and psychogenic groups, the latter scoring higher on all three scales. However, there are no significant differences on any of the measures between the organic and convulsive groups.

Table 3 presents data on the per cent of cases in each of the experimental groups in which the verbal scale quotient differed or failed to differ from the performance scale quotient by at least 10 points. A chi-square test shows that the relative frequency with which the verbal I. Q. exceeded the performance I. Q. or the performance I. Q. exceeded the verbal I. Q. is not significantly different in these groups.

TABLE 3. *Relation between quotients on verbal and performance sections of the Wechsler-Bellevue Scale*

Groups	Verbal > Performance (per cent)	Performance > Verbal (per cent)	Verbal $\neq$ Performance (per cent)
Organic	27.5	28.6	43.9
Psychogenic	18.4	26.5	55.1
Convulsive	22.9	22.9	54.2

Hewson's method correctly identified 56.2 per cent of the patients with intracranial abnormalities. It falsely suggested an organic involvement in 12.2 per cent of the psychogenic patients but correctly detected 59.2 per cent of those with a functional disorder. Only 31.4 per cent of patients diagnosed as having a convulsive disorder of undetermined cause would be considered to have organic brain disease on the basis of Hewson's pattern of deviation ratios. Table 4 summarizes the results based on this method of analyzing Wechsler-Bellevue

TABLE 4. *Hewson's pattern of deviation ratios as applied to the groups*

Group	Suggestive of cerebral lesion	Suggestive of emotional disturbance	No evidence of either
Organic (N=91)	53	32	6
Psychogenic (N=49)	6	29	14
Convulsive (N=35)	11	23	1

subtest scores. A chi-square test indicates significance at better than the .001 level.\*

Table 5 shows that the accuracy of prediction is enhanced when a total battery of psychologic tests is used. A chi-square analysis indicates significance at the .001 level.

TABLE 5. *Over-all impression based on psychologic testing*

Group	Impression			
	Organicity		No organicity	
	Number	Per cent	Number	Per cent
Organic (N=91)	60	65.9	31	34.1
Psychogenic (N=49)	2	4.1	47	95.9
Convulsive (N=35)	11	31.4	24	68.6

### DISCUSSION

The observation that the organic group, as a whole, scored lower on the Wechsler-Bellevue Scale than did the other patients is in general agreement with Allen<sup>1</sup> and with Hunt and Cofer,<sup>4</sup> who found that organic brain disease tends to depress the I. Q. It is noteworthy that this lowering of I. Q. is reflected almost equally on performance and verbal tests. Contrary to the belief generally prevailing among clinicians, organic impairment does not seem to be more pronounced in the performance sphere. The assumption that emotionally disturbed patients do particularly poorly in the performance area seems likewise to be unwarranted. Irrespective of whether the mental disorder was caused by psychopathologic or organic brain disease, the majority of patients demonstrated a fairly small difference between verbal and performance section ratings. Even when this difference was large, it was probably of little diagnostic significance.

The finding that patients with demonstrable brain disease resemble more closely in intellectual functioning the patients who have seizures of undetermined cause than they do patients with psychogenic disorders is in disagreement with two studies cited by Klebanoff and associates.<sup>4</sup> In these studies a similar pattern was found for epileptics and neurotics which was strikingly different from that of organic patients.



In evaluating the Hewson method for detecting organic impairment, two major limitations inherent in the methodology employed in the present study should be mentioned. Both of these operated to reduce the apparent effectiveness of her technic. The first relates to the fact that the pattern of deviation ratios should more appropriately be tested only on patients having a cerebral abnormality. No claim was ever made by Hewson that the method could be applied to any type of intracranial lesion, as was done in the present study. Second, some of the cases doubtlessly represented a mixed picture in which there were significant emotional problems present in addition to an organic involvement. In these instances the emotional problems, if severe enough, may have masked the organic pattern. Thus it would seem that her method fared rather well considering these limitations imposed by the experimental design. Omitting the convulsive patients, the Hewson method correctly identified the organic or psychogenic condition in 59 per cent of the cases. The false positives, *i. e.*, the number of psychogenic cases erroneously classified as being suggestive of organic brain disease, was restricted to 12 per cent.

It comes as little surprise that a whole battery of tests is more useful in making these discriminations than is one single test. The psychologist often obtains important diagnostic clues from instruments such as the Rorschach or the projective drawings. With the assistance of the whole battery, correct identifications increased to 76 per cent, the false positives decreased to 4 per cent. In these computations the convulsive group, which presented a special problem, is omitted. It is interesting that in only about a third of the patients with idiopathic seizures were the test results suggestive of brain disease.

#### SUMMARY

The present study concerned itself with the performance of three groups of patients on the Wechsler-Bellevue Scale, Form 1. Not only were intellectual differences analyzed, but the efficacy for diagnosis of various commonly employed technics based on the Wechsler-Bellevue Scale was also investigated. The subjects in this study were a group of patients with psychogenic disorders, a group of patients having intracranial abnormalities, and a group of patients having seizures of undetermined cause. The results indicated that patients with organic brain disease score lower on all three Wechsler scales than do patients with psychogenic disturbances, and that convulsive patients tend to resemble the organic subjects more closely than they do functional patients. Differences between verbal and performance scale ratings do not seem to be related to diagnostic category. It was also demonstrated that the Hewson method is helpful for

diagnosis, but that the use of a whole battery of psychological tests yields superior results.

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## BABIES ARE NOT STUPID

I advise my young mothers to let the baby belch after feeding, change his diaper, and place him in bed wide awake. Some state that if the baby goes to sleep while feeding, she would not dare to awaken him, but would put him down and slip out of the room. This is courting trouble. Just as the baby that is rocked to sleep requires rocking when he wakes up, so the baby that is fed to sleep demands to be fed when he awakens. He is not hungry but wants to return to the satisfactory situation he was enjoying when he went to sleep. Personally, I think he would be a little stupid if he did not expect this and it is my opinion that the average baby is far from being stupid. In fact, if we could understand them as well as they understand us, our problems would be minimal.

—HUGHES KENNEDY, M. D.  
in *Journal of Medical Association of  
State of Alabama*, p. 189, Feb. 1955

# ROSENZWEIG PICTURE FRUSTRATION STUDY FOR SELECTING SAFE DRIVERS

FREDERICK L. MCGUIRE, *Lieutenant (junior grade) (MSC) USN*

**I**N CONNECTION with the problem of highway safety, recent research has concerned itself with the task of attempting to measure, by psychometric methods, those personal factors that might distinguish between the safe and unsafe automobile driver. Studies have indicated that personality-type test items show considerable promise as predictors of ability to drive a motor vehicle safely.<sup>1-4</sup>

The Rosenzweig Picture Frustration Study (P-F Study), while still relatively new and untried, assumes to measure the modes of reaction to frustration that a person may adopt. The P-F Study consists of 24 picture situations involving two or more people. One person has made a statement, the other person is pictured with a blank balloon above his head. In some manner the other person is being threatened; i. e., being accused of some act, being deprived of some wanted object, et cetera. The subject is required to write a reply in the blank balloon that he imagines the threatened person would make (fig. 1). In this manner, the subject's reaction to the situation is determined. The assumption is that reaction to these pseudosituations is a measure of how the subject might react in similar situations in real life. It is further assumed that the subject consciously or unconsciously identifies himself with the frustrated person in each pictured situation and projects his own bias in the replies given.

To determine this bias, scores are assigned each response as to direction of aggression and reaction type. Under direction of aggression are included (1) extrapunitive, in which aggression is turned onto the environment; (2) introjective, in which it is turned by the subject upon himself; and (3) impulsive, in which aggression is evaded in an attempt to gloss over the frustration. Under type of reaction fall (1) obstacle-dominance, in which the barrier occasioning the frustration stands out in the responses; (2) ego-defense, in which the ego of the subject predominates; and (3) need-persistence, in which the solution of the frustrating problem is emphasized.

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From Naval Medical Field Research Laboratory, Camp Lejeune, N. C. Lt. McGuire is now assigned to U. S. Naval Hospital, Philadelphia, Pa.

From the combination of these factors there results for each picture nine possible scoring factors and two special variants.



Figure 1. Representative page from the Rosenzweig Picture Frustration Study.

It is logical to hypothesize that an automobile driver's reactions to frustrating situations, especially on the highway, could be a prime factor in determining how safely he drives. Certainly a person who is willing to accept the give and take of highway travel will not tend to commit an unsafe act when confronted by such things as traffic jams and the annoying be-

havior of certain fellow drivers. With this in mind, the P-F Study was submitted to two different groups of automobile drivers in an attempt to evaluate its ability to distinguish between the safe and the unsafe driver.

### METHOD

Two groups were studied. One group consisted of those persons who had had at least one traffic accident within recent months during which they had also incurred a moving traffic violation. The other group consisted of persons who had never been involved in any kind of accident or incurred a traffic violation of any type.

The accident group was selected after an examination of Camp Lejeune accident records and was comprised of those persons who had been involved in an accident and had also been cited as being guilty of a moving violation. The noneccident group was selected from those whose answers to a questionnaire indicated that they might be completely accident and violation free. Each of the group was further screened by interview technique.

From 446 subjects, 67 were found to be accident and violation free and to match a group of equal size from the accident-violation subjects. The basis for this selection and matching was: experience in years driving on state highways, estimated miles driven over the previous two years, age, marital status, parenthood, education in terms of highest grade completed, and number of years in service (table 1). The accident-violation record of the accident group is shown in table 2.

In addition to these factors, intelligence test scores as derived by General Classification Test (GCT) (civilian version) scores were equated on a group basis. The respective means were 108.7 and 109.2, with standard deviations (S. D.) of 17.6 and 14.8. The significance of difference between the means is represented by a critical ratio (c. r.) of 0.1947, which is not significant.

As part of a testing program each subject of both groups received the Rosenzweig Picture Frustration Study and a personnel interview. The P-F Study was scored according to the method developed and outlined by Rosenzweig and associates.\*

In addition to analyzing and comparing those scores routinely derived from the P-F Study, the results were subjected to an item analysis. This analysis allowed certain responses to specific test situations to be selected on the basis of whether or not they discriminated between the two groups.

### RESULTS AND DISCUSSION

Of the various scores routinely produced by the P-F Study, only the Ego Defensive (E-D) and Need-Persistence (N-P) scales

TABLE 1. *Characteristics of accident and nonaccident groups*

<u>Driving Experience in Years</u>	<u>A-V Free</u>	<u>A</u>
0-2.9	6	6
3-5.9	17	18
6-7.9	22	22
8-9.9	11	11
10 and over	11	10
<u>Age</u>		
18-21	15	15
22-25	44	44
26-30	4	4
31-40	4	4
<u>Marital Status</u>		
Single	39	39
Married, no children	28	28
Married with children	11	11
<u>Two-Year Mileage</u>		
0-5,000	9	9
5,001-10,000	9	9
10,001-15,000	7	7
15,001-20,000	7	7
20,001-30,000	16	16
30,001-40,000	4	4
40,001-50,000	5	5
50,001-and over	10	10
<u>Education</u>		
Grades 4-8	12	14
Grades 9-12	47	47
Grades 13-16	8	6
<u>Years in Service</u>		
0-1.9	26	22
2-4.9	36	30
5 and over	11	15

showed significant differences at the 1 percent level of confidence. These results are outlined in table 3.

An item analysis of the 134 tests produced 10 significantly differentiating scores for 5 of the 24 test cartoons. These scores were all significantly different to about the 1 percent level of confidence (critical ratio as listed in table 4).

Each test was then rescored according to a method based on these 10 scores and the scores derived from the E-D and N-P percentages. The 10 items were simply arranged in order of the magnitude of the difference between the 2 groups, and the first 5 assigned a weight of 2 and the second 5 a weight of 1.

TABLE 2. *Accident-violation record of accident group (lifetime)*

Accidents (with and without violations*)	Violations* (without accidents)				
	0	1	2	3	6
1 (with)	9	18	2	1	1
2 (with)	3	5	-	1	-
2 (1 with; 1 without)	8	1	5	3	-
3 (1 with; 2 without)	3	1	-	-	-
3 (2 with; 1 without)	-	1	2	-	-
3 (with)	1	1	-	-	-
5 (3 with; 2 without)	-	1	-	-	-

\*All violations listed are moving violations.

TABLE 3. *Parameters of the E-D and N-P scales that differentiate between accident and nonaccident groups*

Scale	Accident group		Nonaccident group		C. R.**
	Mean	S. D.*	Mean	S. D.	
E-D	53.3	10.170	59.3	11.153	3.229
N-P	30.7	09.450	24.9	10.320	3.368

\*Standard deviation

\*\*Critical ratio

TABLE 4. *Rosenzweig stem scores used to differentiate between accident and nonaccident groups*

Picture number	Score	Group with highest frequency	C. R.*	Weight
4	E-D	Nonaccident	2.9375	-2
13	m**	Accident	2.9017	+2
18	m	Accident	2.8385	+1
11	M***	Nonaccident	2.8024	-2
15	m	Accident	2.6933	+1
13	N-P	Accident	2.6841	+2
18	N-P	Accident	2.6632	+1
13	E-D	Nonaccident	2.6272	-2
4	m	Accident	2.5751	+1
4	N-P	Accident	2.4363	+1

\*Critical ratio.

\*\*Hope expressed that solution eventually will be found

\*\*\*Blame for frustration evaded

Scores characteristic of the nonaccident group were assigned a negative weight; scores characteristic of the accident group were assigned a positive weight. For those scores derived from the E-D and N-P percents, weight was given according to the number of standard deviations any particular score fell toward or away from the mean of the other group. For example, with the N-P scores, all that fell within plus 1 S. D. of the nonaccident group mean and within minus 1 S. D. of the accident group mean were given a weight of 0, because these scores overlapped to too great an extent to be helpful in distinguishing between the groups. All scores falling between 1.0 and 1.5 S. D. below the nonaccident group mean were assigned a weight of minus 1; those falling between 1.5 and 2.0 S. D. below the mean were assigned a weight of minus 2; et cetera, until all scores encountered in the study were thereby assigned a weight. All scores that fell in similar fashion about the accident group mean were assigned the same weights with a plus sign (table 5).

TABLE 5. *Weight assigned E-D and N-P percentages used in differentiating between accident and non-accident groups*

Ego-defensive		Need-persistence	
Percentage	Weight	Percentage	Weight
Under 37.0	+5	Under 11.8	-5
37.0 - 39.7	+4	11.8 - 14.2	-4
39.8 - 42.5	+3	14.3 - 16.5	-3
42.6 - 45.3	+2	16.6 - 18.9	-2
45.4 - 48.1	+1	19.0 - 21.3	-1
48.2 - 63.5	0	21.4 - 35.1	0
63.6 - 66.0	-1	35.2 - 37.8	+1
66.1 - 68.6	-2	37.9 - 40.4	+2
68.7 - 71.1	-3	40.5 - 43.0	+3
71.2 - 73.6	-4	43.1 - 45.5	+4
73.7 and over	-5	45.6 and over	+5

In order to eliminate the inconvenience of dealing with minus numbers, each of the resulting test scores was converted to a plus score by making a raw score of 0 equal to 20. A minus 5 then became 15, a plus 5 became 25, and so forth.

The test scores resulting from the combined procedure produced the parameters in table 6.

The biserial correlation yielded by these parameters is 0.53 ( $\pm .06$ ). Biserial correlations are not adaptable to prediction formulas and do not yield an error of estimate. However, it is possible to establish a cutoff score that will produce a maximum level of prediction for the scale. In this case a score of 21 or



lower was used for predicting inclusion in the nonaccident group. By using percent of total area under the normal curve between the mean ordinate and an ordinate at a given sigma distance, a success of prediction results, as seen in table 7.

TABLE 6. *Test scores after weighting as described in text*

	Nonaccident group	Accident group	Combined group
Mean	17.99	23.78	20.89
S. D.	6.19	6.33	6.88

TABLE 7. *Success of prediction using method described in text*

Cutoff score	Nonaccident group		Accident group		Percent total correct
	Percent correctly chosen	Percent incorrectly chosen	Percent correctly chosen	Percent incorrectly chosen	
21 - 22	68.79	31.21	61.03	38.97	64.91

These figures are not particularly impressive if one desires to use this scale as a sole means of selecting safe automobile drivers, but it might be of value as part of a test battery after being subjected to sufficient cross-validation. However, it is important to know that a test such as this can produce a correlation that is statistically significant and considerably higher than many that have been reported in the literature. It speaks well for the future development of techniques like the Picture Frustration Study.

On the basis of these figures I have put together a collection of cartoons that deal entirely with highway situations. To date they have been used only clinically, with no attempt at systematic analysis.

#### SUMMARY AND CONCLUSIONS

Two groups of automobile drivers were given the Rosenzweig Picture Frustration Study in addition to other tests. These groups numbered 67 men each, and were equated according to age, marital status, parenthood, education, intelligence test score, years of driving experience, estimated mileage driven for the last 2 years, and time spent in service. Those in the first group were completely accident and violation free for their entire driving history, while those in the second were involved in at least one recent traffic accident in which they were charged with a moving violation.

The Rosenzweig Picture Frustration Study produced significant differences between the groups only on the basis of the Ego-Defensive and Need-Persistence percentages. In addition, item analysis of the test allowed 10 item scores to be used in differentiating between the groups. By weighting and combining the percentages and item scores it became possible to differentiate between the two groups. The biserial correlation obtained was 0.53 and the efficiency of prediction was 64.91 percent.

While this correlation does not allow the P-F Study to be used as a sole prediction instrument, it does indicate that test items such as those contained in this test have promise for future application to the problem of differentiating between the safe and unsafe automobile driver.

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#### THE ART OF SELF-EXPRESSION

The lack of competence of most physicians as speakers is not surprising. After all, they spend their time doctoring and not orating. Medical teachers need not be orators but they can avail themselves of some of the modern visual aids in teaching and learn some of the rudiments of clear presentation. Too often slides used are so complicated that they merely confuse. Medical movies, colored slides and so forth have great value as adjuncts in teaching. Much assistance in the planning and execution of teaching exercises can be given by a professional organization.

—LAURENCE B. ELLIS, M. D.  
in *New England Journal of Medicine*  
p. 245, Feb. 11, 1954

# ENURESIS: CLINICAL, LABORATORY, AND ELECTROENCEPHALOGRAPHIC STUDIES

CHESTER M. PIERCE, *Lieutenant (MC) USN*

HARRY H. LIPCON, *Captain (MC) USN*

JOSEPH H. McLARY, *Ph. B.*

HOWARD F. NOBLE, *Lieutenant (MSC) USN*

FROM the most remote times of antiquity, in such diverse civilizations as the Mesopotamian, Hindu, and Greek, physicians have treated disorders of the genitourinary tract.<sup>1-3</sup> However, enuresis is one disorder which has baffled medical science for centuries. In his *Natural History*, the Roman Pliny prescribes a course of therapy to eradicate enuresis that includes such measures as the consumption of wood lice and spayed awine's urina.<sup>4</sup> This is similar to some more present-day treatments in which the unfortunate suffering from enuresis is served fried rats or mouse pie in an effort to effect a cure.<sup>1,5</sup> Goldsma,<sup>6</sup> in a review of the medical history of enuresis, lists an astonishing number of desperate and drastic treatments extant in the 18th, 19th, and 20th centuries that frequently are without any apparent rationale.

To the United States Navy, the effects of enuresis are tremendous in scope since they include inestimable economic and morale problems. The enuretic is deemed unsatisfactory for sea duty because the confined quarters and lack of ventilation compounds the unsavory ammoniacal odor. The enuretic seaman is subjected to teasing, derision, jibes, and taunts. He may make a valiant effort to break his habit by reducing his water intake and making frequent visits during the night to the "head." As the difficulty persists, however, the man becomes subjected to more intense tirades and even minor aggressions by his shipmates. Furthermore, the sleeping accommodations on board many ships are such that the enuretic's habit would be tangibly objectionable to any man who might happen to occupy a bunk beneath him. The enuretic may become the indirect cause for an impairment in the efficiency of the crew.

These inconveniences to the individual and the group are even more striking when viewed during the process of "boot training." For all men this is, at best, a period of turmoil, but for the enuretic it is a period that presents near-insurmountable adjustment

problems. The competitive, masculine standards of military life will not allow such a blatantly overt manifestation of what is generally considered to be "immaturity." As the enuretic is often responsible for the accumulation of demerits for the entire company, he is liable to become the target for all manner of group dissatisfactions, which are many during the rigorous process of attempting to convert a civilian boy into a military man in a relatively short period. Also, the harassed company commander finds the habit of enuresis particularly offensive, since it reflects on the ideals which he is trying to inculcate in his group. The warrior, stereotypically, is not a bed wetter. Therefore, despite whatever progress in training a man might make, if he is enuretic he has to contend with negative feelings from many sources. Not infrequently, this cumulative stress so taxes his capacity to adjust that all areas of his naval life are adversely affected and he has more difficulty with enuresis. This vicious cycle is so extreme that even a man with many successful ego strengths would be pressed to remain emotionally stable. It must be fully appreciated that the deleterious influence of this vicious cycle on one man so affects his interpersonal relationships that serious disruption of the group results, and consequently its over-all training suffers. For these reasons the enuretic recruit is discharged from the Navy.

Although it is realized that to go home after being in the Navy for only a few weeks may cause serious emotional traumata, such as feelings of self-devaluation and inadequacy, to the youth as he re-integrates into his home community, these matters are beyond the control of the Navy. The youth must handle for himself his own attitudes as well as those arising from injured family pride or from a condescending, patronizing, or hostile community.

#### PURPOSE

Between 25 February 1954 and 25 February 1955, nearly one out of every 100 men entering naval service at this naval training center was discharged prior to completion of boot camp because of enuresis.<sup>7</sup> This represents a drain on available manpower, a considerable economic expenditure in transporting and training men who will never contribute to the Navy, and a variety of morale problems. Accordingly, it was considered that the study of enuresis was necessary from a practical viewpoint. Since there is a super-abundance of clinical case material in the military which would not be available to civilian investigators, it was believed also that perhaps some contribution to the further understanding of enuresis might result. Therefore these studies\* were made: (1) to determine which, if any, enuretic recruits might be

\*The authors wish to express their gratitude to Capt. H. J. Bowen, (MC) USN, and Comdr. A. J. Zuska (MC) USN for their assistance in performing this study.

rehabilitated for service in the Navy, and (2) to discover any objective methods which would aid in the quicker detection of those incapable of being rehabilitated.

In regard to rehabilitation, it is hypothesized that some enuretics might possess enough assets to warrant their retention, even if only in some limited capacity such as permanent shore duty, where they could make definite contributions to the service. In times of complete mobilization, the loss of all enuretics could represent a needless diminution of naval strength. On the other hand, it is important to detect as soon as possible, whether in war or peacetime, those enuretics who are unable to make positive contributions and who are carried along until separated as economic and psychiatric liabilities.

In the first investigation biologic, social, and psychologic factors were surveyed in a comprehensive manner in the hope that further paths of fruitful study would be indicated. Ultimately, we hope to establish a treatment colony that will test the efficacy of various modes of therapy aimed at facilitating the rehabilitation of enuretics. This report is concerned with the findings of clinical, laboratory, and electroencephalographic examination. Future reports of the primary research project will deal separately with psycho-social factors and other research approaches.

### DEFINITION

For the purposes of our investigation we shall use Wilson's<sup>a</sup> definition of enuresis: "Enuresis, then, can be defined as bed- or clothes-wetting (in those) above the age of 3, who fail to inhibit the reflex when the impulse is felt during waking hours, or do not rouse from sleep of their own accord when the process is imminent."

### MATERIAL

In this primary study we contrasted 60 enuretic recruits with 60 men in Electronics School. Considerable effort was made to be certain that all enuretics actually suffered persistently from this difficulty. Not only did we have observations by company commanders and trained hospital corpsmen, but in each instance, upon the man's admission to the neuropsychiatric unit, a telegram was sent to a social service agency in his home area requesting them to procure information from his family in regard to enuresis. This use of telegraphic confirmation of enuresis was not known generally, so it is unlikely that recruits had any chance to solicit the aid of their loved ones in perpetrating fraud. In addition, there was other evidence besides the admitted history of enuresis, observations by competent persons, and telegraphic confirmation. This evidence included documents filled out by the recruit when he entered the Navy in regard to his past history

of enuresis. At this time, most youths are too motivated for service and too unsophisticated in military ways to plan for an early discharge by falsifying this record. Several recruits were sent for medical evaluation upon discovery of tell-tale mattress rings during inspection by the company commander. We believe that these measures were successful in deleting from the study those youths who purposely wet the bed in an effort to escape from service. The fact that many resort to purposeful bedwetting is a well-known fact to all military and medical officers and has been commented upon frequently in the medical literature. Parenthetically, it might be added that approximately 40 per cent of the telegrams sent out failed to confirm the alleged history of enuresis.

It is regrettable that military circumstances precluded the procurement of a random recruit control group more closely matched to the experimental group. The control group was made up of men who had finished an initial course in mathematics and were ready to enter basic electronics. As will be seen, this control group represented slightly different ranges in age and length of service. A more radical difference can be observed when the geographic and racial distributions of the groups are contrasted. Also, the I Q's of the control group used differed more markedly from those of the experimental than would those of a random group. However deplorable this situation might be from a scientific viewpoint, the groups used do consist of individuals regarded as unsuitable for service and those regarded as highly suitable. The Electronic School represents one of the most coveted service school assignments, and the caliber of its candidates is the highest, generally, that can be found among enlisted men.

#### METHOD

A three-part procedure was used in this investigation. On both experimental and control groups the following studies were carried out: (1) electroencephalographic examination, (2) administration of a battery of psychologic tests, and (3) psychiatric interviewing. This article will discuss only the electroencephalograms and the clinical and laboratory findings.

The electroencephalographic tracings were all made on an Offner type ink-writing oscillograph with the technic of 12 lead monopolar and bipolar recordings, bilaterally, from the frontal, parietal, and occipital areas. All the recordings were made within a period of three hours after eating.

It may be assumed fairly that all men in the study were in "normal health," since they had all undergone recent, thorough physical examinations. The population we were dealing with and the fact that its members were able to participate actively in

military service is functional evidence of good health. To control the study, however, diligent inquiry into the past history of sickness, injury, and circumstances of birth of all the men was made. Particular emphasis was placed on any periods of unconsciousness and on positive findings in the review of the genitourinary system. Any family history of enuresis or of convulsive disorders was also carefully sought. The findings elicited from this inquiry are summarized in table 1. Neurologic examination was performed on each man. On approximately one third of the men from each group, voided specimens of urine were obtained at random and studied.

TABLE 1. *Findings in medical histories of 60 enuretic and 60 normal subjects*

Findings	Enuretics		Controls	
	No.	%	No.	%
Past history of enuresis	60	100.0	14	23.3
Family history of enuresis	45	75.0	10	16.7
Somnambulism	16	26.6	2	3.3
Unconsciousness				
Fainting	15	25.0	8	13.3
Other causes	10	16.7	20	33.3
Delirium during febrile illness	2	3.3	2	3.3
Epilepsy				
Suspected	7	11.7	0	
Treated for	3	5.0	0	
Anosmia	1	1.7	1	1.7

## RESULTS

No significant abnormalities were found by physical or neurologic examination in any person included in this report. Three enuretics and one of the controls showed absence of a cremasteric reflex; these men had been subjected to herniorrhaphy. One enuretic and one control claimed to have anosmia and were discovered by routine tests (tobacco, cinnamon, nail polish) to have some gross impairment in olfactory sensation. The enuretic was suspected of malingering, and the control dates his anosmia from a rhinoplasty. One enuretic and one control were judged to have nystagmoid motion on lateral gaze, and in each case it was presumed to be congenital. One control showed some sequelae from a severed left ulnar nerve. Another control persistently demonstrated marked increased muscle strength throughout the right side of his body. All these men had negative electroencephalograms and negative urinary findings by history and by urinalysis, if performed.

Two enuretics, however, were noted to have divergent strabismus. One had an abnormal brain wave and complaints of frequency and urgency; the other had a negative brain wave and negative urinary findings.

Only 1 (1.7 per cent) of the controls showed a borderline electroencephalogram; 59 readings were interpreted as normal. Fifteen (25 per cent) of the enuretics, however, had other than normal electroencephalograms. Of these, two were read as borderline, while 13 were abnormal; all were characterized generally by a poorly regulated and poorly developed alpha rhythm of about 8 to 10 per second. The location of the abnormality was always in the anterior and posterior portions of the head, and the speed, typically, had slow activity of about 5 per second. Upon hyperventilation, there was consistent building up of the amplitude and a slowing of waves to about 4 per second. The single borderline control record demonstrated 10 per second alpha rhythm in the anterior and posterior portions of the head, with slow activity (5 to 6 per second) of mildly increased amplitude. It was of interest that the control showing a borderline electroencephalogram had been enuretic until the age of 15 and had immediate family members who wet their beds.

A review of the genitourinary system of 60 controls revealed four isolated complaints. None of these complaints were of present interest to the subject. The enuretics, however, registered 76 complaints, nearly all of which were of current and life-long concern to the subjects. The control subject with the borderline electroencephalogram had no complaints. The type and frequency of these complaints in both groups are outlined in table 2.

Urinalyses were done on 26 men in the experimental group and on 20 men in the control group. The research design calls for more careful attention to qualitative and quantitative urine observations in the future; these specimens were done merely to see if any detectable trends were apparent. In addition to the findings in table 3, the enuretics' urine showed three times as many cellular casts (27:8).

Table 4 summarizes the statistical treatment of the electroencephalographic relationships.

Each of three enuretics was a member of a set of twins. None of the controls had co-twins. Two enuretics were fraternal twins. Both of these men had negative brain waves, but one had an enuretic co-twin. The third enuretic, who had an identical twin (who was not enuretic), had an abnormal brain wave.

Two enuretics had been delivered at birth by cesarean section. Like the one control who had been delivered in this manner, they had normal brain waves. One enuretic had been delivered by



TABLE 2. *Type and frequency of genitourinary complaints occurring in enuretic and control groups*

Complaints	Times occurring in		
	Enuretic group		Control group (60)
	Normal EEG (45)	Abnormal EEG (15)	
Urgency	20	5	1
Difficulty initiating stream	3	3	1
Burning	9	2	1
Frequency	11	3	1
Dysuria	5	2	0
Purulent or smoky urine	3	1	0
Nocturnal dribbling	1	0	0
Costo-vertebral angle tenderness	5	0	0
History of glomerulonephritis	2	1	0

TABLE 3. *Findings of urinalyses in 26 enuretic and 20 normal subjects*

Findings	Times occurring in			
	Enuretic group		Control group	
	No.	%	No.	%
Acid	21	80.8	13	65.0
Proteinuria	3	11.5	0	0.0
Albumin (trace)	0	0.0	1	5.0
Specific gravity				
Under 1.015	3	11.5	1	5.0
Over 1.022	2	7.7	11	55.0

breech and he, too, had a normal brain wave. One enuretic stated that both he and his mother were uremic at the time of his birth. He had an abnormal brain wave and was ostensibly "organic" on direct examination of the mental status. A random blood urea nitrogen determination on this man was 20 mg per 100 ml, and he complained of urgency and difficulty in initiating micturition.

TABLE 4. *Significance of findings in enuretic and control groups*

Findings	Observed frequency		$\chi^2$ *	P**	Inter-pretation
	Enuretics	Controls			
Abnormal EEG's	15	1	10.56	0.01	+++
Family history of enuresis	45	10	21.02	0.01	+++
Abnormal EEG's and positive family history	9	1	4.90	0.05	++
Genitourinary symptoms	38	3	35.02	0.01	+++
Genitourinary symptoms and abnormal EEG's	8	0	6.12	0.02	++
Genitourinary symptoms, abnormal EEG's, and family history	5	0	3.20	0.05	+
History of sleepwalking	16	2	9.40	0.01	+++

\*Chi-square

\*\*Probability

+Borderline significance

++Significant

+++Highly significant

Most of the controls having a history of unconsciousness from causes other than fainting had been knocked out while engaged in sports. None of them seemed to have suffered epileptic seizures. Five of the enuretics who had lost consciousness from causes other than fainting seemed to have had seizures of some sort.

## DISCUSSION

An integrated commentary at this juncture in our studies is not possible. Also, many of the most enlightening observations made during this experiment are based on the psychologic and psychiatric data. Much of what has been indicated by this particular phase of the study will be thoroughly discussed in our report concerning research suggestions.

Readers outside the field of neuropsychiatry may not be fully aware of the implications of anosmia. Anosmia often is the only symptom of olfactory meningioma. This tumor has been called the most important in psychiatry since its mental manifestations are protean and it is frequently remediable by operation.<sup>9,10</sup> In a study of electroencephalograms, accordingly, one must be alert to this diagnosis in the evaluation of data. By means of thorough roentgenographic and clinical examinations we believe we excluded the possibility of this tumor in this series of cases.

Another point to consider is the medical histories of subjects undergoing electroencephalographic examination. Of the 10 enuret-

ics suspected of or treated for epilepsy (table 1), five had family members definitely diagnosed as epileptic. Seven of the 10 had abnormal brain waves. In the controls there were no personal histories suggestive of epilepsy and only one situation of a family member being treated for epilepsy. The contrast in these groups forces one to recall the oft-quoted dictum of Froude that nocturnal enuresis, unless epileptic, must be considered a "pollution."<sup>11</sup>

Eminent medical scholars have wondered if the electroencephalographic pattern could be an hereditary trait and an indirect index of cortical metabolism,<sup>12,13</sup> while other investigators have satisfied themselves as to the existence of central nervous system pathways and nuclei which regulate micturition.<sup>14-16</sup> The integrity of these multiple centers is regarded as essential for normal micturition. Regulatory controls for the voluntary detrusor vesicae and external and internal sphincters, as well as for subcortical centers, sensory centers, and nuclei for correlation, have been described. These centers are variously located in the precentral gyrus (detrusor vesicae and external sphincter), paracentral lobule and outer sigmoid gyrus (internal sphincter), cerebral peduncle, thalamus, and corpus striatum (subcortical centers), frontal lobe, cerebellum, and corpus striatum (nuclei for correlation), and midbrain and gyrus fornicatus (sensory centers).

The significant preponderance of abnormal brain waves in the chronic adolescent male enuretics whom we have studied strongly suggests that an organic factor must be considered in determining the causes of enuresis. Further evidence of this factor is adduced from the fact that 75 per cent of enuretics had a family history of enuresis.

Confirmation of findings by other workers in regard to the presence of abnormal brain waves in enuretics is made by our investigation. Turton and Spear<sup>17</sup> reviewed the literature on this subject and presented their findings of 51 abnormal electroencephalograms from a study of 100 severely enuretic children. They, too, concluded that in many cases of enuresis there must be a physical basis for the symptom. There are other organic factors assumed to be causes of enuresis, such as urethral strictures and congenital defects, that are beyond the scope of this article because they do not specifically involve electroencephalograms.

After studying the pedigrees of 59 clans, Frary<sup>18</sup> in a classic work hypothesized that enuresis is determined by a single recessive gene substitute. Most workers in the field have decided that there apparently is a familial aspect to enuresis, although many attribute this to sociocultural influences, while many others merely note the relationship. We found exactly the same percentage of positive family histories that Levine<sup>9</sup> noted in his study of 150 enuretic sailors during World War II.

The abnormal electroencephalogram and a family history of enuresis indicate a factor of organicity, although the causes of enuresis seem to be numerous. We would like to suggest a third possibility which should be further developed. Recently, a resourceful investigation has shown, by means of electroencephalograms and electromyograms, that the enuretic is physiologically awake at the time of wetting.<sup>19</sup> We shall not enter at this time into the controversy as to whether or not the enuretic is a "heavy sleeper." However, sleep disturbances may be characteristic of the enuretic and may be a direct and measurable result of an inherited gene pattern. The distorted gene pattern might cause abnormal brain waves, as well as sleep disturbances such as night terrors and somnolence, which have been known for many years to occur in enuretics.<sup>20</sup>

There has been little commentary in the literature concerning the occurrence of sleepwalking in enuretics. Berdie and Wallen<sup>21</sup> found that their enuretic marines were more likely to sleepwalk than a matched control group, but they did not give numerical information. Unpublished data that we are now collecting would indicate that adolescent male sleepwalkers commonly have a problem of enuresis. In our study it was found that a significantly large number of enuretics were sleepwalkers.

Perhaps a neurophysiologic explanation for some cases of enuresis will result from increasing knowledge of those factors in the reticular brain stem formation which manage the state of wakefulness.<sup>22, 23</sup> Theoretically, genetically determined, anatomic impairment might explain in some cases the occurrence of enuresis and the clinical observations of abnormal brain waves, the high correlation of positive family histories of enuresis, and the proclivity to sleep disturbances.

Evaluation of the urinary findings is difficult. Creevy<sup>15</sup> discusses the effect on micturition of lesions in the nervous system. He quotes also from the literature concerning the effects of brain lesions on bladder disturbance. The methodologic troubles secondary to producing specific lesions in mixed motor-sensory nerves makes judgment of experimental results difficult. Nevertheless, one is reminded of the enuretic's complaints of frequency, dysuria, and urgency when he considers that these complaints are sequelae to sensory or motor irritation in the nervous system. Of course, it is very likely that the enuretic dwells more consciously on the malfunctioning of his renal system, for an organic lesion would provide a socially acceptable explanation for his "weak kidneys." In talking to hundreds of enuretics, however, we have gained the opinion that in many cases much of the preoccupation with genitourinary problems has an authentic organic basis. We must defer at this time a consideration of how this may relate to brain waves or to urinalysis findings.

## SUMMARY

The importance of enuresis as a military problem is discussed. A survey of possible organic, psychic, and social factors in etiology was undertaken in an effort to determine which enuretics could be salvaged for the Navy and what treatment methods might be used for this purpose.

Study of 60 enuretic recruits and 60 nonenuretic Electronic School students reveals that more enuretics have abnormal brain waves (25 per cent to 1.7 per cent), more enuretics have relatives who are enuretic (75 per cent to 16.7 per cent), enuretics have more problems with sleepwalking (26.6 per cent to 3.3 per cent), more genitourinary complaints (76.4), and there is evidence suggesting that enuretics' urine is qualitatively different.

It is postulated that in the chronic adolescent male enuretic, a factor of organicity must be reckoned with in the consideration of causes, although there must also be multiple factors of a "functional" nature.

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### WHAT CHILDREN INHERIT

Children acquire the quality of dominance or submission characteristic of the parent of the same sex and the quality of hypoordinacy or hyperordinacy characteristic of the parent of the opposite sex, if they have no older siblings of their own sex. Succeeding children are usually opposite in temperament from the preceding sibling of the same sex if this preceding sibling is not more than a few years older.

—FRANK R. BARTA, M. D.  
in *Nebraska State Medical Journal*  
p. 501, Dec. 1954

### BEHAVIOR

"Biology supplies an arm and fingers, a skeleton and muscles, and a reflex and 'voluntary' control of movement; but it cannot yet account for the individual characteristics of each person's handwriting. Biology can pretty well characterize the violin but is only on the edge of understanding why one plays sweetly, another not. The biologist is happy to recognize that two men or two violins are more like each other than like anything else in the world; psychiatric practice takes the violin for granted and is concerned with the sour notes that come from certain ones. Biological science seems to deal with the Cheshire cat; mental science, with its smile."

—R. W. GERARD, M. D.  
in *American Journal of Psychiatry*  
p. 81, Aug. 1955

# THE NEW RAPID TEST FOR BILIRUBINURIA

## Its Usefulness in Hepatitis

WILLIAM S. HAUBRICH, *Captain, MC, USAR*

With the Technical Assistance of  
A. E. Lister, *Sergeant, first class, Medical Service, USA*

**O**BJECTIVELY, acute hepatitis is characterized, in successive phases, by bilirubinuria, increased urinary urobilinogen, elevated concentration of serum bilirubin, aberrations in the several flocculation tests, and abnormal retention of injected sulfobromophthalein. In the absence of a specific test for viral hepatitis, these determinations are of value not only in the diagnosis of the disease but also in following its course. Of the parameters listed, bilirubinuria usually is the first which may be detected and one of the most consistent through the course of acute hepatitis.

Recently, there has been made available a simple, rapid test for the detection of bilirubinuria, based upon the property of bilirubin to couple with diazo compounds to produce a characteristic color reaction.<sup>1,2</sup> The active reagent (*p*-nitrobenzene diazonium *p*-toluene sulfonate) is incorporated in a stable tablet\* which is used in a manner similar to the well-known tablet tests for sugar, acetone, and blood. The test requires only the tablet, a suitable mat (supplied with the commercial package containing the tablets), and water; the result is available in 30 seconds.

The purpose of this study was to correlate the presence of bilirubinuria with the concentration of serum bilirubin and the clinical course of hepatitis as observed in hospitalized patients.

### MATERIAL AND METHODS

Clinical and laboratory observations were made on 50 unselected patients of the gastroenterology service in this hospital

*From Madigan Army Hospital, Tacoma, Wash. Dr. Haubrich is now at The Henry Ford Hospital, Detroit 2, Mich.*

\*Manufactured under the proprietary name "Ictotest" by the Ames Company, Inc., Elkhart, Ind. The item is available from the Armed Services Medical Stock List (Stock No. 6505-290-6031, Bilirubin Test Kit, 90 diazonium tablets and 90 absorption mats).

because of liver disease during the year prior to 1 May 1955. The series included 40 patients with acute viral hepatitis, presumably of the IH type; the remainder had protracted hepatocellular disease, *e. g.*, Laennec's cirrhosis, fatty metamorphosis of the liver, and chronic hepatitis. Serial determinations of serum bilirubin, thymol turbidity, cephalin-cholesterol flocculation, sulfobromophthalein retention (in the absence of jaundice), and the urinary concentrations of bilirubin and urobilinogen were recorded at intervals of one week or less. The tablet test for bilirubinuria was performed according to the method described in detail by Giordano and Winstead.<sup>2</sup> Almost 1,000 tests for bile in the urine were performed by this method in the course of this study.

## RESULTS

Bilirubinuria was detected in all cases of acute hepatitis during the icteric phase of the disease. Of 169 simultaneous determinations of bilirubin in both the serum and urine, 8.3 per cent of the reactions were recorded as negative for bilirubinuria in the presence of elevated serum bilirubin concentrations. In 14.2 per cent of the determinations, a positive reaction for bile in the urine was obtained when the serum bilirubin concentration totaled less than 1.2 mg per 100 ml; however, in only two of these patients was the "direct-reacting" fraction less than 0.2 mg per 100 ml. A general, although inconsistent, correlation was observed between the concentrations of serum bilirubin and the quantitative estimation of bile in the urine (fig. 1).

Without exception, the tablet test for bilirubinuria was positive in patients with acute hepatitis at the time of the patient's admission to the hospital. In almost all patients bilirubinuria was consistently present through the overtly icteric phase of the disease even though the patient's urine had resumed a normal color to casual inspection. In the group of patients with acute hepatitis admitted directly from the unit dispensaries, an elevated serum bilirubin persisted for an average of 27.2 days. In about two thirds of the patients, bilirubinuria disappeared shortly prior to the return of serum bilirubin to normal. The course of the disease, as observed in this group, was comparable with that succinctly depicted in the official monograph dealing with infectious hepatitis.<sup>3</sup>

*Comment.* The rapid tablet test has been established as a sensitive and reasonably reliable detector of bilirubin in the urine, and it has been demonstrated to compare favorably with the more cumbersome, orthodox Watson-Hawkinson and Harrison tests.<sup>1,2</sup> In our experience, we have found the test easy to set up and to read, and remarkably adaptable to the patient's bedside, the physician's office, the dispensary, and the field. The



sensitivity of the reagent is attested by the observation that a positive color reaction is obtained within 30 seconds on the addition of urine containing as little as 0.03 mg of bilirubin.<sup>2</sup> At the same time, caution must be exercised to avoid misreading as "positive" a faint pink blush which may appear at the base of the tablet with addition of water or a color reaction which appears after 30 seconds.

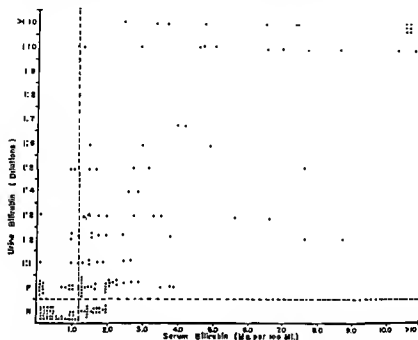


Figure 1. Scattergram depicting the correlation in 169 simultaneous determinations of bilirubin in serum and urine taken from patients with active hepatocellular disease. At the ordinate, P denotes positive and N denotes negative; to the left and below the broken lines lie normal values.

## DISCUSSION

**Usefulness of the Test in Diagnosis.** By analysis of our cases of acute viral hepatitis observed within the past year, we have found the first symptoms of the disease develop on an average of 7.5 days prior to the patient's admission to the hospital. Invariably these symptoms were protean with rarely a suggestion that frank hepatitis was to ensue within little more than a week. It was during this prodrome that the soldier usually presented himself for the first time to the unit dispensary. It is little wonder that in almost every case, in the absence of more definitive signs, he was returned to duty and received only symptomatic treatment.

It is noteworthy that we found "dark urine" to have been observed by the patient on an average of 5.5 days prior to admission. In almost all cases this was the first definitive sign of liver disease. Curiously, the patient seldom related this observation voluntarily, and only by direct questioning could this sign be elicited. In only two patients was the appearance of "dark urine" delayed until the onset of overt jaundice; in the remainder, "dark urine" preceded awareness of jaundice by an average of 3.9 days. Jaundice was detected, either by the patient, his buddies, or the physician, only 1.7 days, on the average, prior to hospitalization.

From the analysis (fig. 2) it is obvious that the best opportunity by which to establish a presumptive diagnosis of hepatitis

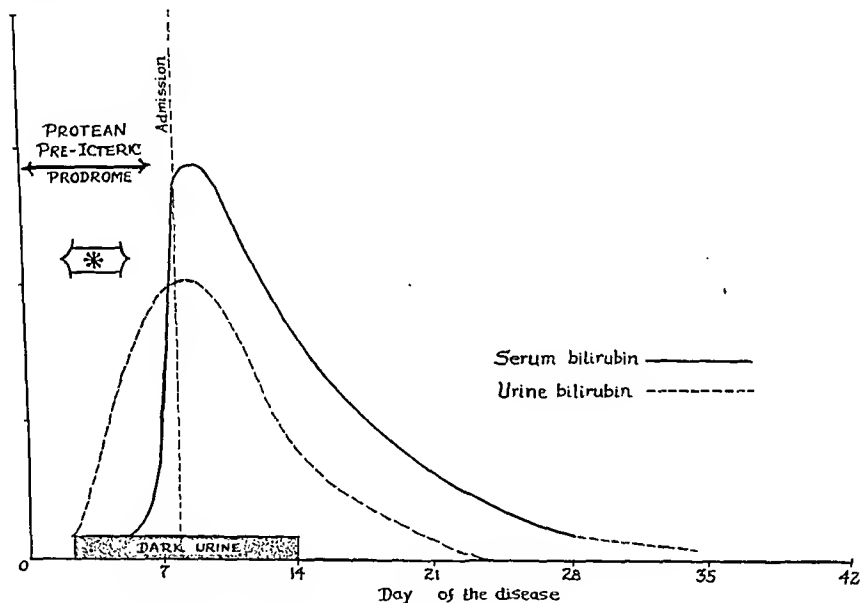


Figure 2. Diagram illustrating the course of acute viral hepatitis as observed in the group of patients described in this study. Particular reference is made to the sequence of bilirubinuria and hyperbilirubinemia. The asterisk denotes the important interval during which bilirubinuria may be the sole definitive sign of the disease in the preicteric phase.

in the preicteric phase lies in the four days during which bilirubinuria is the sole and only easily detected, definitive sign of the disease. How often is the medical officer in a quandary regarding the possible existence of acute hepatitis in the soldier complaining of nondescript malaise, anorexia, nausea, and vomiting? Given this meager information alone it is exceedingly difficult to assign an accurate diagnosis. In such a case, however, when one can determine objectively the presence of bile in the urine, the diagnostic problem may be resolved. The prompt

detection of hepatitis will result in earlier hospitalization and the institution of appropriate supportive treatment, which can favorably affect the subsequent course of the disease. Further, such early detection more quickly withdraws the soldier who harbors the virus from his unit organization and could be expected to diminish the likelihood of contagion.

**Usefulness of the Test in Following the Disease.** In observing the course of acute viral hepatitis, a series of sequential "milestones" is customarily noted. With the advent of frank jaundice usually the subjective discomfort of the patient remarkably subsides. Nausea is abated, appetite returns, the notorious distaste for tobacco disappears, and the distress in the right upper abdominal quadrant, if present, diminishes. In our group of patients, with only two exceptions, the peak concentration of serum bilirubin was recorded at admission, and almost invariably the jaundice gradually diminished following institution of the "liver rest and support regimen." In sequence, the next observation is usually an apparent return to normal in the color of the urine. However, in our series, "occult bile" by chemical test remained even though the urine appeared to be of normal color. Grossly apparent jaundice then disappeared although the serum bilirubin concentrations slightly exceeded normal values. Bilirubinuria cleared in an average of four days before the serum bilirubin reached normal levels in both the "direct" and "indirect" fractions. For an unexplained reason, in about one third of our patients, bilirubinuria persisted beyond the return of serum bilirubin to normal. Perhaps this reflects an altered renal threshold for bilirubin.<sup>1</sup> Finally, the sulfobromophthalein retention test, that we use after overt jaundice has disappeared, remains elevated usually one or two weeks.

Usually when the findings of the serum bilirubin concentration test approach the normal, we permit the patient to begin progressive ambulation. When the sulfobromophthalein test returns to normal, the patient is usually released from the hospital. We find we are neither justified nor required to insist upon normalcy in the flocculation tests before returning the patient to duty. Often there is an inordinately protracted period during which these tests may remain "positive" and yet during which there is no other sign of activity of the disease.

With this sequence of events, we have found the rapid test for bilirubinuria to furnish us with a signal, in the absence of overt jaundice, that the serum bilirubin may be expected to reach a normal concentration within a short interval. This may permit slightly earlier ambulation and subsequent rehabilitation in a majority of patients.

## SUMMARY AND CONCLUSIONS

Experience with a new, rapid test for bilirubinuria (ictotest) is described in a relatively large group of patients with acute viral hepatitis. We have found the test simple, sensitive, and reliable. There is a reasonably good correlation between bilirubinuria as detected by this test and relative concentrations of serum bilirubin.

The test should be of primary value in the early detection of acute viral hepatitis prior to the frankly icteric phase, thus facilitating earlier hospitalization and treatment. It is helpful in following the course of the disease and often heralds the return of normal serum bilirubin concentration. This may serve as a criterion for beginning progressive rehabilitation of the patient.

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## A PHYSICIAN'S TRUE WORTH

The great strides in medical knowledge have come through the voluntary efforts of the individual. Once an idea has been shown to have merit, its sponsor has generally won the material support necessary to develop the idea. Remember, pain is not deterred by race, creed, wealth, or poverty. Medicine and surgery know and are restrained by no boundaries. A physician's true worth lies in his knowledge and understanding of things of the past and those of today, combined with his ability to anticipate tomorrow's need and apply the sum total in the care of and for the welfare of the patient at hand.

—WILLIAM A. HUDSON, M. D.  
in *Diseases of the Chest*  
p. 72, Dec. 1954

# ARTHRO-ONYCHODYSPLASIA

## A Hereditary Syndrome

HAROLD BRODER, *Captain, USAF (MC)*

**A** HEREDITARY syndrome consisting of an unusual combination of skeletal disorders forms the basis for this report. Bilateral posterior dislocation of the radial head, hypoplasia and lateral dislocation of the patellas, dystrophy of the nails, and a horizontal sacrum were discovered during the examination of a young airman. Similar abnormalities existed in an older brother and had been present for three known generations of the same family.

### CASE REPORTS

**Case 1.** A 17-year-old man sought advice at this hospital because of pain and swelling in the knees after marching and prolonged standing. These symptoms had been noted following excessive activity for many years. Physical and roentgenographic examination revealed the following: (a) *Knees*—knobby in appearance (fig. 1); very small patellas articulating with lateral aspect of lateral femoral condyle; shallow articular groove on lateral femoral condyle for patella (fig. 2); downward and oblique lateral pull of quadriceps tendon; shallow, empty, palpable intercondylar notch of the femur; prominent medial femoral condyle; prominent tibial tubercle with lateral displacement; active motion, 160° to 45°; passive motion, 185° to 45°; no ligamentous instability. (b) *Elbows*—radial head prominent posteriorly at level of upper end of olecranon; atrophy of capitellum (fig. 3); limitation of terminal 15° of extension, pronation, and supination. (c) *Nails*—absence of both thumb nails; grayish discoloration and longitudinal ridging of other nails of hands and feet. (d) *Back*—severe lumbar lordosis; horizontal sacrum (fig. 4). (e) *Legs and feet*—external rotation deformity of leg, 45°; secondary varus of feet (in order to point the feet forward in walking).

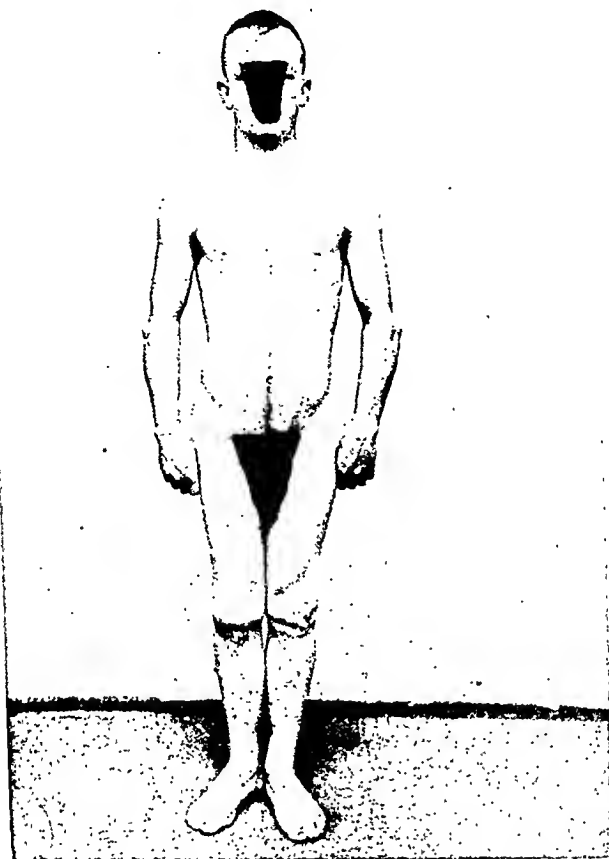
**Case 2.** The patient's 21-year-old brother had similar defects of the right elbow, knees, nails, and spine. The complaints again were limited to the knees (fig. 5).

The maternal grandfather and mother were both affected as were our patients. They were dead, however, and their histories could not be confirmed by examination. No information was available concerning the grandfather's forebears. An older brother and

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From U. S. Air Force Hospital, Parks Air Force Base, Calif.

a younger sister of the mother were unaffected. An older sister and younger brother of the third generation were entirely normal.



*Figure 1 (case 1). Patient with arthro-onychodysplasia. Note knobby appearance of knees, external rotation of legs, posterior prominence of radial heads.*

#### DISCUSSION

While isolated hereditary posterior displacement of the radial head, patellar dysplasia with or without dislocation,<sup>1-3</sup> dystrophy of the nails<sup>4-6</sup> and horizontal sacrum are not uncommon, their combined appearance as a familial disorder is exceedingly rare. A hereditary triad characterized by posterior dislocation of the radial head, hypoplasia with lateral dislocation or absence of the patella, and dystrophy of the nails has been described by Aschner,<sup>7</sup> Bates,<sup>8</sup> Lester,<sup>9</sup> Montant and Eggerman,<sup>10</sup> Senturia and Senturia,<sup>11</sup> Sever,<sup>12</sup> Turner,<sup>13</sup> and Wildervanck.<sup>14</sup> The triad is generally present in its entirety or in part in some members of successive generations. Turner described one family in which



*Figure 2 (case 1). Anteroposterior view of knees. Note hypoplasia and lateral position of patella, external rotation of tibia and fibula.*



*Figure 3 (case 1). Lateral view of elbows, showing position of radial head.*

the arthrodysplasia and nail dystrophy were found in 26 of 39 members, and a second family in which 27 of 41 suffered nail dystrophy but only nine of these had the arthrodysplasia. Aschner, Senturia and Senturia, and Turner believe that the genealogy in this syndrome is of the non-sex-linked, dominant variety. Aschner has postulated that, "With such rare deformities it cannot be merely by chance that these defects are inherited together." She has explained the clinical data known about the syndrome by the phenomenon of linkage, with close neighborhood of linked characters.



*Figure 4 (case 1). Lateral view of lumbosacral spine, showing horizontal position of sacrum.*

The defects are carried simultaneously by the mesoderm and ectoderm in three closely linked pathological factors. Since the triad does not appear as frequently as the combination of nail and patellar dystrophy, there must be a more intimate linkage between the genes for the patella and the nails than for the radial head. Other less plausible theories have attributed the anomalies to a single gene, or to a third inhibiting factor which is responsible for the arthrodysplasia when absent. Various supplementary anomalies have been described with the basic triad. Turner reported a dark, clover-shaped central ring in the iris about the pupil, an increase in the normal concavity of the external surface



of the ilium, and various minor bony aberrations about the shoulder girdle in some cases. In a patient described by Bates, "iliac horns" accompanied the syndrome. No previous record of a horizontal sacrum accompanying the triad could be found.



Figure 5 (case 2). Anteroposterior view of knees, showing particularly the shallow articular groove present on lateral aspect of lateral femoral condyle for articulation with the patella.

### SUMMARY

An unusual hereditary syndrome, characterized by various combinations of dysplasia of the elbows and knees and dystrophy of the nails, is discussed. Four members of a family in which the triad has been transmitted through three known generations are reported. The sole disabling feature in the two living members was directly caused by the knee anomaly. Both the knee and the elbow abnormalities would be amenable to improvement by surgical correction at an early age.

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## MEDICINE IN THE NEWS

We recognize that the public is interested in all things medical, particularly new and promising procedures. They are intrigued by articles on medical subjects that become available to them. No one should object to the dissemination of newsworthy information but it should be mature and reliable. Spectacular journalism should be discouraged. The physicians themselves are the most reliable sources of trustworthy information. We should furnish material on new or interesting medical subjects because it will tend to discourage some of the zealous lay writers and it will maintain the confidence and friendship of the people as patients.

—CHARLES SELLERS, M. D.  
in *Detroit Medical News*  
p. 18, Dec. 6, 1954

# GASTRO-INTESTINAL PROBLEMS IN CHRONIC PULMONARY DISEASE

JAMES C. SYNER, *Captain, MC, USA*

**I**N treating patients with chronic pulmonary disease, problems involving the gastro-intestinal system arise which significantly affect the management of the total patient. Frequently the patient's primary concern is with his gastro-intestinal difficulties, while the physician concentrates on the pulmonary abnormalities. This is because the physician tends to focus on "findings" whereas the patient will focus on "symptoms." This is strikingly illustrated by the patient with bronchiectasis who is concerned with loss of appetite, "no taste" for his favorite foods, and weight loss, while the physician evaluates bacterial flora, character and amount of sputum production, and abnormal pulmonary physiology. Awareness of the patient's concern, apprehension, and anxiety over such difficulties is fundamental to optimum management of the total patient.

## SCOPE OF THE PROBLEM

This presentation will be limited to gastro-intestinal problems secondary to a primary pulmonary disease, thereby excluding the following:

1. Gastro-intestinal problems arising either as a direct result of generalized systemic toxicity and spread of the primary process or from treatment complications in acute pulmonary diseases. This is illustrated by a staphylococcal pseudomucinous enterocolitis reported as a complication of antibiotic therapy employed to treat an acute, toxic lobar pneumonia in a patient without an underlying chronic pulmonary disease. Complications of this nature following the use of antibiotics have been reported previously.<sup>1-3</sup>

2. Chronic pulmonary disease resulting from a primary gastro-intestinal problem. This is illustrated by a bronchiectasis resulting from diseases of the esophagus, such as cardiospasm, peptic esophagitis with obstruction, and diverticulum producing recurring contamination of the pulmonary tree by secretions and food particles infected by mouth bacteria.<sup>4</sup>

3. A major form of anatomic disease demonstrated in the gastro-intestinal tract in a patient with a chronic pulmonary disease,

From Walter Reed Army Hospital, Washington, O. C. Capt. Syner is now assigned to Fitzsimons Army Hospital, Denver, Colo.

February 1956)

where no causal relationship between the two could be found. This is illustrated by a gastric cancer, peptic ulcer, cholelithiasis, et cetera, in a patient with a chronic pulmonary disease.

### METHODS AND MATERIALS

The data herein presented were obtained from a review of 604 patients managed on either an outpatient or inpatient basis in the medical chest section of this hospital. The presentation will be made in reference to two basic categories:

1. Gastro-intestinal problems arising directly from the disease process, for example, an inguinal hernia resulting from severe, explosive, paroxysmal cough in chronic bronchitis.

2. Gastro-intestinal problems arising as a complication of therapy, for example, nausea attending the use of potassium iodide.

The following criteria are applicable to the patients included in the statistical count:

1. The term "problem" is herein defined to be inclusive of both "signs" and "symptoms."

2. Patients have been followed over the course of several visits and/or hospitalizations in the medical chest section.

3. The pulmonary problems are of long standing, commonly of several years' duration.

### DETERMINATION OF THE DIAGNOSIS

The cases presented herein include most of the usually encountered forms of chronic pulmonary disease (table 1). All diagnoses were well documented by careful, prolonged clinical observation and appropriate laboratory data. In almost all cases of bronchiectasis included in the article, a positive bronchogram demonstrating the characteristic anatomic changes supported the clinical diagnosis. In the few patients lacking bronchographic examination, evidence of ectatic degeneration was convincingly indicated by the clinical course, frequency of intercurrent respiratory infections, amount and character of sputum production, lung markings on roentgenograms, and moist, bubbling-type rales on auscultation.

Because of the natural history of the process and the characteristics shared by the three most commonly occurring diseases (table 1), careful consideration was given to the criteria herein accepted for establishing the final diagnosis. This was necessary because of the common occurrence of bronchospasm in bronchitis and emphysema, and the fact that a severe, persisting asthma or bronchitis finally can evolve into a state of progressive emphysematous decompensation. In this phase of the disease process the major problem is the emphysema and is to be so counted for

the record. The criteria and clinical features used in this presentation are discussed in detail elsewhere,<sup>8</sup> and are in close agreement with those recorded in previous reports.<sup>6-7</sup> The fundamental "ground rule" for handling this problem is that "all that wheezes and squeaks is not asthma."

TABLE 1. Diagnoses in 616 patients with chronic pulmonary disease reviewed for incidence and nature of gastro-intestinal problems

Diagnosis	Number of cases	Percent of total
Bronchitis	195	31.65
Asthma	87	14.12
Emphysema	60	9.74
Tuberculosis	55	8.92
Brochiectasis	47	7.63
Coin lesions	36	5.84
Hilar adeoopathy	34	5.61
Pulmonary sarcoidosis	30	4.87
Bronchogenic carcinoma	18	2.92
Pulmonary fibrosis	18	2.92
Giant air cysts	12	1.93
Fungus		1.45
Histoplasmosis	4	
Coccidiomycosis	3	
Blastomycosis	2	
Pectus excavatum	8	1.29
Dorsal kyphoscoliosis	4	.64
Primary pulmonary hypertension	2	.32
Pulmonary arteriovenous fistula	1	.16

In our experience, pulmonary fibrosis, to some small degree, is a very common occurrence in patients with chronic pulmonary disease. It was so diagnosed for this study only when it was found to be the major pathologic change. A criterion of major significance in this diagnosis was a reduction of at least 1,000 ml in the total lung volume as determined by pulmonary function studies.

#### GASTRO-INTESTINAL PROBLEMS AND RELATION TO PULMONARY DISEASE

It is not a difficult matter to relate gastro-intestinal problems to treatment measures for pulmonary diseases. There is almost always a clear-cut relationship between the initiation of treat-

ment, the onset of complications, and the clearing of the difficulties on the withdrawal of therapy. In the absence of this cause-and-effect relationship between treatment and complications, it is very difficult to screen significant symptoms in patients who have chronic disease. The question arises whether it can be determined positively that symptoms arising in other bodily systems are the direct result of a chronic process elsewhere. This consideration entails an evaluation of the role played by functional (psychiatric) disturbances in giving rise to widespread symptoms and somatic reactions outside the system immediately involved. No attempt has been made to sift out functional from organic causes in the problems listed. Each complaint must be evaluated and analyzed in relation to the total problem. I prefer to adopt the point of view that the problems are of mixed origin, being both functional and organic. The implication is that in the absence of the chronic pulmonary disease the gastro-intestinal problems might not have arisen. Anorexia is a classical illustration of this consideration and will be discussed in detail in relation to chronic suppurative disease of the lungs.

Deciding what was to be counted as diarrhea posed certain difficulties. Two or three soft stools per day, even though representing a change from usual bowel habits, was not considered to be diarrhea. The presence of multiple, watery, painfully cramping bowel movements were the features characterizing diarrhea as used for this presentation. This is important in counting complications to broad-spectrum antibiotic therapy, for the presence of two or three soft stools per day, without abdominal cramping, was a rather common finding, whereas the presence of multiple, watery, painfully cramping bowel movements necessitating interruption of therapy was not a frequent complication.

The gastro-intestinal problems encountered and their incidence in the 616 cases are listed in table 2. The three occurring most commonly accounted for 68 per cent of the total complaints. Their distribution as complications of the disease or treatment measures also is given in table 2.

The counts on anorexia, nausea, and vomiting may appear higher than those observed by others. It may be that factors peculiar to mess procedures in the military were involved. However, conducting this review emphasized the importance of specifically interviewing the patient about problems outside the system of chronic involvement. The systemic review must be repeated frequently in following a patient with chronic disease. A great deal can pass unnoticed if one waits for the patient to volunteer information.

## ANALYSIS OF GASTRO-INTESTINAL PROBLEMS

*Anorexia, nausea, vomiting*

In patients with chronic suppurative disease, anorexia is a common complaint. It is usually not a chronic problem, but reappears with enough frequency to concern the patient, provoke weight loss, and necessitate medical help and advice. The patient states the problem as one of experiencing a sensation of hunger which is lost almost immediately on sight of food or soon after a few mouthfuls have been taken. It is found more commonly in

TABLE 2. *Type, frequency, and probable cause of gastro-intestinal problems in 616 patients treated for pulmonary disease*

Problem	Number due to treatment	Number due to pulmonary disease	Total
Anorexia	23	95	118
Nausea	41	21	62
Vomiting	25	12	37
Abdominal pain	16	8	24
Dysphagia		10	10
Liver involvement (tender; palpable; abnormal chemistries)		8	8
Hernia			8
Inguinal, direct		7	
Inguinal, indirect		1	
Diarrhea	7	1	8
Difficult liver biopsy (Vim-Silverman needle)		4	4
Dehiscence (postoperative)		3	3
Clinical vitamin B deficiency	3		3
Stomatitis, pharyngitis, esophagitis	3		3
Ileus		2	2
Tracheo-esophageal fistula		1	1
Total	118	173	291

patients with bronchiectasis than in those with bronchitis, and particularly among those who produce copious amounts of foul, purulent, greenish sputum. Several factors, such as foul mouth taste, psychologic disgust toward raising sputum, and the effect of purulent sputum on gastric mucosa could be considered as causes. The association between gastro-intestinal complaints and the swallowing of purulent sputum has been previously re-

ported.<sup>10</sup> These authors described the results of gastrosopic examination and smears of gastric secretions in 17 patients with chronic pulmonary suppurative disease. Gastrosopic examination was normal in all but two patients, who demonstrated mucosal edema of the gastric antrum with localized atrophic gastritis. The authors did not consider these gastric mucosal abnormalities as being significant, since mucosal edema is a transient phenomenon which does not mean organic disease. These two patients did not have complaints. Six patients who did have gastro-intestinal complaints had normal gastrosopic and gastric-smear findings. Bockus<sup>11</sup> has stated that constant swallowing of mucopurulent material may develop chronic gastritis if achlorhydria is present.

A number of patients had linked their anorexia to the absence or diminution of taste. This could well be a complication of the chronic nasal involvement in patients with chronic bronchitis and bronchiectasis. The nasal mucosa appears edematous, inflamed, thickened, granular, covered with tenacious mucoid or purulent sinus drainage, and frequently presents the boggy, bluish discoloration associated with allergic disease. These changes could certainly inhibit the optimum function of the olfactory modality.

Nausea and vomiting have been infrequent findings in bronchitis and bronchiectasis. When they do appear it is usually in this sequence: a paroxysm of severe coughing, retching, and finally the production of vomitus. The patient may describe the experience as the "dry heaves." Some patients will vomit during and following the production of copious, foul, purulent sputum.

In emphysema, especially in advanced cases, anorexia is a frequent problem. Nausea and vomiting are infrequent. Most likely anorexia is the result of an uncomfortable feeling of fullness and distention after a few mouthfuls of food have been taken. The more advanced the degree of emphysematous decompensation, with flattened, fixed diaphragms and labored, fatiguing abdominal breathing, the more marked is the problem.

In the terminal stage of bronchogenic carcinoma, anorexia is almost always present. Nausea and vomiting are not infrequent, but are undoubtedly limited by the patient's restricted oral intake. The size of the pulmonary lesion does not appear to bear a relationship to these particular problems.

When pulmonary sarcoidosis is accompanied by significant parenchymal involvement of the lungs, anorexia can be a very troublesome problem. In particular, anorexia has been more frequent and severe when pulmonary function is significantly diminished. That it might be related to widespread visceral involvement cannot be ruled out. To date, about 75 per cent of our patients who had pulmonary sarcoidosis and who have had a biopsy of a



specimen of the liver had hepatic sarcoid with noncaseating granulomatous tubercles. Palmer<sup>12</sup> has demonstrated this kind of granulomatous lesion in biopsy specimens from the gastric mucosa.

### *Abdominal pain*

This complaint is usually related to treatment measures (table 2). In cases where it was thought to be due to the disease process, severe, explosive cough seemed to be the common denominator. The effect of flattened, fixed diaphragms and labored abdominal breathing in emphysema may be responsible. The areas of pain are usually the costal margin and midepigastrium.

### *Dysphagia*

This problem was identified almost exclusively in severe dorsal kyphoscoliosis and pectus excavatum. It appeared to be related to the interference with chest expansion and changes in position of mediastinal structures produced by the skeletal deformity. These patients all demonstrated significant diminution in the efficiency and capacity of their ventilatory performances.

### *Liver involvement*

The presence of a palpable, tender liver resulting from chronic pulmonary disease was limited to the late stage of cor pulmonale. The basic pathophysiologic finding was passive congestion of the liver due to right heart failure with venous congestion. Abnormal liver chemistries were characteristic of hepatocellular damage.

### *Hernia*

Although it cannot positively be stated that hernia is a direct result of cough, the dynamics of cough with its increasing of the intra-abdominal pressure presents a situation ideal for promoting herniation. The majority of patients with this complication have far-advanced emphysema with markedly flattened, fixed diaphragms and severe, explosive cough.

### *Diarrhea*

The problem of diarrhea was almost always the result of treatment measures (table 2). Previous reports indicate that tuberculosis of the intestinal tract is a frequent, severe complication of pulmonary tuberculosis.<sup>13</sup> From this information one could expect diarrhea to be a common problem in pulmonary tuberculosis. In our recent experience, however, this has not been the case. As intestinal lesions are prone to occur during the early, active stage of tuberculosis, and rarely before the pulmonary lesion has been discovered, the use of current antituberculosis chemotherapy either diminishes or masks the symptoms of this complication. According to a report from Fitzsimons Army Hospital<sup>13</sup> approxi-

mately 25 per cent of pulmonary tuberculosis patients in sanatoria have clinical or radiologic evidence of intestinal tuberculosis. Intestinal involvement usually occurs in the ileocecal region (85 per cent) because of the affinity of *Mycobacterium tuberculosis* for lymphoid tissue. Spread from the lung may occur by direct extension via swallowing or by hematogenous or lymphatic spread.

### *Difficult liver biopsy*

This problem was encountered only in patients with far-advanced emphysema. In addition to the obvious part played by lung volume inflation, flaring of lower rib cage, and flattened diaphragms in preventing the needle from reaching the liver, atrophy and fibrotic contracture of the liver may have been present. The four patients in whom liver tissue could not be obtained had been diagnosed as having Laennec's cirrhosis.

### *Dehiscence (postoperative)*

This complication arose in patients with chronic bronchitis and emphysema who postoperatively had pneumonia with severe, explosive cough. The complication appeared to be directly related to the severity and dynamics of the cough.

### *Trachea-esophageal fistula*

This complication arose in a 56-year-old white man with advanced metastatic squamous cell carcinoma of the lung.

## GASTRO-INTESTINAL PROBLEMS FROM TREATMENT OF CHRONIC PULMONARY DISEASE

Tables 2 and 3 summarize the frequency distribution and nature of gastro-intestinal problems arising as complications of treatment. The triad of anorexia, nausea, and vomiting was by far the most frequent and bothersome. There is little more in the way of detail that need be added to the information provided in the charts.

Recently a large number of outpatients were given short, periodic courses of wide-spectrum antibiotics (aureomycin (brand of chlortetracycline hydrochloride) and terramycin (brand of oxytetracycline)) in the management of intercurrent infections complicating such chronic states as emphysema, bronchitis, bronchiectasis, and fibrosis. To my knowledge only two or three of the total have had complications necessitating change or interruption of therapy. The usual schedule consisted of 250 mg of terramycin or aureomycin 4 times daily for 3 to 6 days. This schedule does not appear to carry the morbidity noted in heavy dosage schedules used for more acute, toxic infectious diseases.<sup>2,3</sup> Usually the problems can be controlled by having the patient take the medication with buttermilk immediately after meals.

TABLE 3. *Procedures and drugs causing gastro-intestinal problems in the management of chronic pulmonary disease*

Treatment	Problems encountered
Antibiotics	
Terramycin hydrochloride	Nausea, vomiting, diarrhea, anorexia, abdominal pain, vitamin B deficiency
Aureomycin hydrochloride	Anorexia, nausea, vomiting, diarrhea, abdominal pain, proctitis
Aerosol penicillin	Stomatitis, esophagitis, hairy tongue
Oxygen via nasal catheter	Stomatitis-pharyngitis-esophagitis (dysphagia)
Pam-aminosalicylic acid	Anorexia, nausea, vomiting, abdominal pain
Triton (brand of alkyl aryl polyether alcohol) aerosol	Stomatitis-pharyngitis (dysphagia)
Aminophylline (orally)	Anorexia, nausea, abdominal pain
Potassium iodide	Anorexia, nausea
Elixir terpin hydrate and codeine	Nausea, vomiting, abdominal pain
Pneumoperitoneum	Anorexia, abdominal pain, constipation

The intra-abdominal complications and sequelae of pneumoperitoneum represented in this series have been limited and with no serious consequences. A recent report indicates an over-all incidence of significant complications of about 1 per cent.<sup>14</sup> Pneumoperitoneum has been definitely incriminated as contributing to the death of two patients.<sup>14</sup> Several patients were reported to have developed low-grade peritonitis with dynamic small-bowel obstruction. Reports in the literature describing accidents incurred as a direct result of air instillation include: (1) air embolism, (2) spontaneous pneumothorax, (3) inflation of hernial sacs, and (4) perforation of hollow or solid abdominal viscera. The use of pneumoperitoneum as treatment of far-advanced emphysema has been disappointing because of numerous complaints, usually from elderly patients, regarding such symptoms as: (1) tight abdominal fullness, (2) crampy pains, (3) anorexia, (4) diarrhea or constipation, and (5) inability to eat a full meal.

The appearance of vitamin B deficiency in three elderly men who were on antibiotic therapy was very striking. Stomatitis, cheilosis, atrophy of tongue papillae with magenta color, and dysphagia were the presenting problems. High vitamin B therapy



## PROGRAM FOR MEDICAL PREPAREDNESS

MAJOR GENERAL SILAS B. HAYS

Surgeon General, U. S. Army

**E**ACH OF THE four Surgeons General since 1939—Magee, Kirk, Bliss, and Armstrong—has served at least part of his term during a period of combat. I sincerely hope that my term will be wholly one of peace. Nevertheless, much of our effort in the immediate future must be devoted to problems of war. The radical changes in concepts and doctrine of war brought about by the development of nuclear weapons make it imperative that we modernize and improve our medical preparedness. The tasks we face are both essential and difficult. Their accomplishment will require a degree of enthusiasm and effort on the part of all concerned that is more characteristic of war than peace.

In facing these problems I am fortunate in having a capable and enthusiastic staff. With their help I have outlined a program which we believe will best accomplish the mission of the Army Medical Service. I want to present this program publicly so that interested persons within and without the Army can assess it, and by expressing their concurrences or differences help translate it into a practical plan of action. I chose this particular occasion to present my views because I know that you, experienced and interested in both military and civilian medicine, are best equipped and motivated to evaluate the program. I am confident that from you will come the frank constructive criticism that this broad program must have before it can be ironed into specific objectives and policies.

My talk today is oriented toward *medical* problems almost exclusively. At a future date it is my hope that similar statements will be made concerning problems and programs of the other components of the Army Medical Service.

### MISSION OF THE ARMY MEDICAL SERVICE

The primary mission of the Army in peacetime is preparation for war. The Army Medical Service, as an integral part of the Army, must never lose sight of its role in accomplishing this mission. At the same time, as a supporting service, it has the equally important mission of maintaining and conserving the health of the Army during peace. I do not view these as separate

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missions but rather as one integrated whole. It is difficult for me to visualize an improvement in the care of the peacetime soldier that does not improve our ability to perform our wartime mission. Furthermore, to the extent that we fail to keep the peacetime soldier in the best possible health, to that extent we make the Army's task of preparing for combat more difficult.

### MEANS OF ACCOMPLISHMENT

We in the Army Medical Service utilize three basic instrumentalities in performing our mission of conserving the fighting strength: first, selection, elimination, and classification of personnel; second, the practice of preventive medicine; and third, the practice of therapeutic medicine.

### MANPOWER

In a major war, manpower will be the Nation's most critical resource, and every person, able-bodied or handicapped, must be utilized. An appreciable part of this program is entrusted to our stewardship. Although personnel selection, elimination, and classification do not have the humanitarian aspects associated with the care of the sick and wounded, our efforts in this area can do much to maintain an efficient, fighting Army. We establish physical and mental standards for induction and separation. If we set our standards too high, we eliminate many persons who could render satisfactory service. If we set them too low, we saddle the Army with noneffectives. If we do not assist in the classification of personnel, handicapped and ineffective persons will be assigned to jobs beyond their capabilities, and able-bodied men to the jobs which require lesser capabilities.

We have learned much from our experience in World War II and more recently, the Korean conflict. However, I believe that we have as yet not fully exploited our experiences. The time has come to test and to approve or discard such programs is now and during mobilization. The area on which we intend to place particular emphasis is classification of personnel—the matching of capabilities of the individual person with requirements of the jobs to be performed in the Army. It is essential that we classify the physical, emotional, and mental qualifications of the person and the corresponding requirements of the job in a manner to facilitate proper assignments in the Army.

### PREVENTIVE MEDICINE

The second instrumentality, preventive medicine—and I include preventive psychiatry in this term—has proved its value. For many years we in the Army have been leaders in this field, and our efforts have paid off not only in the health of our troops but in the health of the whole Nation. When applied to prevent

medicine, the old adage, "a penny saved is a penny earned," should be changed to "a penny saved is two pennies earned"; for each soldier kept out of the medical stream another who would be required to care for him is freed for nonmedical duties. We do not intend to let the Army Medical Service rest on past laurels in this field. Current projects which show promise will be continued and I hope brought to successful conclusion. Remaining problems of preventive medicine will be sought out and studied.

The Army is now in one of the healthiest periods of its history. The noneffective rate exclusive of battle casualties, which is the most meaningful index of health in the Army, dropped from 20.2 per 1,000 strength per year in fiscal year 1953 to 15.8 in 1954 and 13.6 in 1955. However, our most recent data indicate that the noneffective rate is leveling off.

Despite recent advances, acute respiratory infections remain the major cause for admission of military personnel to hospitals and quarters. Incidence rates for acute respiratory infections have been higher at installations engaged in basic training than at other Army posts. Last winter the incidence rate for common respiratory infections and influenza at installations training recruits was almost two and one-half times as high as at posts with seasoned troops; the incidence rate for pneumonia was more than five times as high. Encouraging progress has been made—much of it here at Walter Reed Army Institute of Research—particularly concerning the cause of certain acute respiratory infections. However, much remains to be accomplished.

The prevention of injuries is another problem which requires attention. Admissions for injuries constitute only about a tenth of total nonbattle admissions to hospitals and quarters, but they account for one fifth of man-days lost and over two thirds of nonbattle deaths in the Army. Within the Army the primary responsibility for accident prevention is placed on G-1. There are, however, definite medical implications in the field of safety which we cannot shirk. In an endeavor to reduce the number of accidents, the Army has sponsored the Accidental Trauma Commission of the Armed Forces Epidemiological Board in several different projects. Studies are underway to determine, if possible, such things as accident proneness and psychiatric, psychologic, and social traits relating to personnel often involved in accidents.

Our over-all approach to psychiatric problems in the Army has shifted heavily to its preventive aspects. During World War II we learned many lessons and developed many policies and procedures which, when applied in the Korean conflict, resulted in a very appreciable saving of manpower. Not only were psy-

chiatric admission rates lowered, but so also were separations from the service for psychiatric reasons.

During the current state of peace, mental hygiene consultation services, division neuropsychiatric service, and other outpatient psychiatric services continue as the mainstay of psychiatric prevention and therapy. The effectiveness of our mental hygiene consultation service is reflected in the large percentage of persons returned to duty. Of 25,000 patients treated for psychiatric conditions last year, over 68 per cent were returned to duty; 26 per cent were recommended for discharge, mostly through administrative channels; and less than 6 per cent were referred to hospitals. Favorable results are also noted in the sharp decrease in both open and closed ward hospitalization rates for neuropsychiatric disorders and in lower separation rates. Currently these services are limited generally to posts of 18,000 strength or more. It is important to extend this approach to oversea areas and to smaller posts in the United States.

The principles of management of combat psychiatric casualties are almost deceptively simple, yet experience has shown that time and again the lessons of the past have been forgotten. One of the principal reasons for this has been the loss or dilution of the trained career officers in the interim between conflicts with a resultant lack of perpetuation of lessons learned. Nuclear war poses new problems in military psychiatry. In a mass casualty situation every physician will have to be a surgeon, and he will also have to be a psychiatrist. It is our intent to see that the principles of preventive psychiatry are fully emphasized and implemented, and that all medical officers receive some training in military psychiatry with particular emphasis on the problems of mass casualties.

Preventive medicine in the Army was originally concerned almost exclusively with prevention of infectious diseases and recent wars have stimulated concentration on preventive psychiatry. The concept of preventive medicine, however, is broader than this. In recent years civilian medicine, particularly industrial medicine, has made strides in considering the individual in relation to his job, keeping him fit for duty and at work. This requires study of both the man and the job. Leaders of industry have found that this approach, although it costs money, pays cold-cash dividends in higher production. I am convinced that we in the Army have a fertile field here which we have not cultivated sufficiently.

#### THERAPEUTIC MEDICINE

Our third instrumentality is the practice of therapeutic medicine and surgery in patient care. Our repute in the Army and in civilian medicine hinges largely on the quality of this care.



The Army Medical Service is proud of the high quality of professional care it renders. One concrete evidence of the standard of patient care in the Army is that out of 40 Army hospitals considered by the Joint Accreditation Committee, 39 have been fully accredited, one provisionally accredited, and none rejected. Today, reference to "medicine as practiced in the Army" is a compliment.

The quality of patient care is not self-perpetuating, however, particularly in the Army where conditions change frequently and sometimes radically. The over-all quality can be maintained only by achieving an acceptable standard for every factor contributing to it. This brings us to the major problem the Army Medical Service is facing today. The quality of our patient care is being threatened because of an imbalance between workload and resources. We have faced such imbalances in the past, but they were of a temporary nature. The current problem, however, will not disappear of its own accord and is bound to become more acute if left alone. Furthermore, the problem is complex and does not lend itself to a single one-shot solution. This problem has many facets—dependent care, the contraction of the Army, the 3 per 1,000 ratio, inadequate incentives for procurement and retention of medical officers, and the change in professional maturity of our doctors. All of these facets must be analyzed and thoroughly understood if a proper solution is to be found.

I have already mentioned the striking reduction in the non-effective rate of Army personnel. This favorable situation is at least partially due to the strong emphasis placed on outpatient care in recent years. It has not only helped reduce hospital admission rates but has contributed to the reduction of the duration of stay of hospital patients. This trend, in combination with the contraction of the Army and the elimination of the few remaining battle casualties from our hospitals, has resulted in a sharp drop in the total volume of patient care for active duty Army personnel. The inpatient load, measured by occupied beds, for active duty Army personnel in 1955 was only half of that in 1953, and even the outpatient load showed some reduction.

I would now like to contrast this experience with the trend in patient workload for families of military personnel. The number of dependents occupying beds in Army hospitals has not decreased, and the number receiving outpatient care has increased by more than one third in the last two years. There are a number of reasons for this increase. One is the tendency toward earlier marriages. The Army has changed from an organization of bachelors to an organization of married men. The most important factor, however, is availability of housing. The dependent

workload varies more with the availability of housing than with troop strength. Family housing on and near military posts is increasing. The net result is that care for military families has increased from a relatively small factor to one fifth of inpatients and one third of outpatients in Army facilities. In actual workload it is an even larger factor. The greater part of family care is in obstetrics and pediatrics, and these patients require considerably more of the physician's time than the average military patient. It is my estimate that 40 per cent of the time of medical officers engaged in patient care is concerned with families. Under the cross-servicing policy, personnel of the Navy and Air Force receive medical care in Army facilities and Army personnel are provided care in Navy and Air Force facilities. In terms of workload, we are in approximate balance with the Navy, but more Air Force personnel receive care in Army facilities than Army personnel in Air Force facilities.

The turnover rate of patients is an important factor due to the volume of work generated on admission and disposition. The length of patient stay in Army hospitals has decreased over 20 per cent in the last two years, requiring more of the physician's time per patient day.

Another important factor is that the size of Army hospitals in operation has decreased markedly. The average size of Army hospitals in the United States is now only two thirds of what it was in May 1953 when the ratio ceiling for medical officers was imposed. This is a direct result of reduced troop strength, the drop in hospital admissions, and the reduction in duration of hospital stay. The smaller the hospital, the more expensive the operation, not only dollarwise but also doctorwise.

#### OTHER RESPONSIBILITIES

The Army Medical Service has many varied responsibilities other than patient care. These responsibilities—research, training, advisory missions to foreign nations, mobilization planning, staff and command responsibilities—have not decreased, and some have increased in recent years. As one example, over 11 per cent of our medical officers in continental United States are currently involved in a large maneuver in Louisiana called operation Sage Brush. Most of these responsibilities are not related to the size of the Army but rather to its mission and deployment. These responsibilities are integral to the Army's basic mission of preparation for war as well as to the maintenance of a high standard of medical care during both war and peace.

#### THE WORKLOAD

*Nevertheless*, the Army is operating under a Medical Corps ceiling related to size of the active Army, and size of the active

Army alone. This ceiling of three medical officers per 1,000 active duty strength was barely adequate at the time it was imposed in May 1953 when the strength of the Army was over one and one-half million; it is inadequate to meet satisfactorily the minimum requirements of the Army under current conditions.

Long before the imposition of ratio ceilings on medical officer strengths, the Army had reduced medical officer utilization radically. As you know, before and during World War II, the Army utilized 5.5 and more medical officers per 1,000 strength. During demobilization when the strength of the Army dropped but battle casualties remained, the ratio rose to approximately 7.5 per 1,000. During the Korean conflict when about 15 per cent of total Army troop strength was engaged in Korea, the over-all ratio was 3.3 medical officers per 1,000 strength. Post-Korea reductions in troop strength raised this ratio only slightly, and it was immediately brought down by further tightening of belts. However, everything has its breaking point. The number of medical officers in training, research, and other essential military medical functions has already been reduced to a level which I believe is less than satisfactory. The noneffective rate has been leveling off so that it is unreasonable to expect any substantial further reduction. These factors cannot be expected to produce further savings to counteract the effects on the doctor ratio of reductions in the size of the Army and the increased family population.

At many posts the situation is already critical, and our high standards of professional care are jeopardized. This is manifested by the short time allotted to individual patients. Many medical officers can allow only 5 to 10 minutes per outpatient, with attendant possibility of missed diagnoses. Appointments for consultations frequently are distressingly delayed. The waiting time in outpatient clinics is excessive. Medical histories become all too brief, incomplete, and lacking in pertinent detail. Progress notes become infrequent, irregular, and incomplete. Medical officers are working long hours without leave; many work 70 or more hours per week. One cannot work at a "continuous sprint" without dire results. The number of official complaints from patients has risen. This imbalance of workload and resources cannot be allowed to continue.

The imbalance can be corrected only by reducing the workload or increasing the relative number of doctors or both. Possibilities of substantially reducing the *military* workload further is out of the question. As you know, a bill is before Congress to provide medical care for military families in civilian facilities, partially at Government expense. In the last couple of years several plans for care of military families have been evolved but all have been controversial, and at this time we have no

way of knowing just what kind of legislation, if any, the Congress will enact.

As I stated at the outset, we must constantly be prepared to support combat. If during peacetime the care of families becomes our *major* workload, it cannot help but de-emphasize our preparedness efforts. It is my hope that the Congress will pass legislation that will assure good medical care of Army families and provide for an effective distribution of this workload between military and civilian resources.

Aside from the humanitarian and professional aspects of the problem, family care is an essential factor in the morale of troops and, therefore, basic to the accomplishment of the Army mission. Medical officers, being both doctors and soldiers, will stretch their capabilities and endurance to the limit before they will deny service to a dependent requiring medical care. Provision of medical care to families is by force of circumstances being tightened up throughout the Army, but it cannot be eliminated nor can it be substantially reduced until other adequate provision is made for such care.

I have been discussing workload; now what about our personnel resources? At present only 35 per cent of our medical officers on active duty are in the Regular Army. Since July 1953, when the ban on resignations was removed, 459 medical officers have resigned, of whom 93 per cent had participated in our residency training program. Our losses by resignation included 184 board-certified officers. This represents a tremendous loss of skilled manpower—skilled not only in professional specialties but also to varying degrees in military competence. Our total losses since July 1953, including resignations, retirements, deaths, and other separations number 553.

Notwithstanding this serious loss of trained medical manpower, we have refused to lower our standards for commissioning in the Regular Army. During this same period we have received 372 applications for commission in the Regular Army Medical Corps. Of these, 58 have been rejected, 63 have either withdrawn their applications or refused their commissions when tendered, 64 are still in process, and 187 have been commissioned in the Regular Army. In brief, our losses since July 1953 have been 553 against gains of only 187, or a net loss in the Regular Army Medical Corps of 366 in this 27-month period. Obviously this situation cannot be allowed to continue if we are to have an Army Medical Service.

#### CAREER INCENTIVE

It has become obvious to all three military departments that radical action must be taken, and taken soon, to increase attrac-

tiveness for the medical officer career. The Secretary of Defense in June appointed a "Task Force Organization to Explore Problem of Attracting Career Medical and Dental Officers." The findings and conclusions of the Task Force have been discussed. Specific programs for implementing the recommendations of the Task Force are being developed. We will do everything within our power to assist in the development of these programs and their implementation in the shortest time possible.

Direct increase in pay requires Congressional action. Increased pay through promotion in rank is, to a considerable degree, within the authority of the three military departments. Within the last month, we have secured approval for increased promotions in the Army Medical and Dental Corps. These approved promotions are now being implemented, and I am sure this will result in improvement both in recruitment and retention of Army medical and dental officers. The Task Force recommended that the doctor ratio be increased from the current 3.0 to 3.4 per 1,000 strength. Implementation of this recommendation would not only improve attractiveness of an Army career in the Medical Corps but would be the most direct and immediate means of enabling us to accomplish our varied and important missions. No definitive action has as yet been taken on this recommendation.

Congress, in extending the Doctor Draft Act until 1 July 1957, made two changes in the Law. First, it lowered the maximum age from 50 to 45; and second, it exempted those over 35 who had previously been rejected for commission because of physical disability. Based on preliminary surveys, it is estimated that there probably are a sufficient number of doctors in the eligible pool to meet our requirements through 1 July 1957 when the law expires. However, in May or June of 1957, it may be necessary to go into the Priority IV group. In this group are certain individuals who have had very short tours of active duty. For example, there are approximately 500 who have had less than 6 months of service, and 750 more who have had between 6 months and 12 months of service. The increase of the ratio from 3.0 to 3.4 would mean the calling up of something less than 1,000 additional physicians for all three services.

The problem is basically an imbalance between workload and personnel resources. On the workload side, the only possibility I see of reduction is some form of dependent care legislation; on the personnel resources side the only solution is an increase in the ratio. The first requires congressional action, the second is a matter of action of the Secretary of Defense and higher authority. The actual solution may be a combination of both. The long-range solution, however, must lie in a strengthening

of the Regular Army Medical Corps, with the concomitant necessity of calling up fewer two-year men.

With the expiration of the Doctor Draft a year and a half from now, the only doctors available for service will be those liable under the regular draft. In the hope that appreciable numbers of this group could have some degree of residency training, Doctor Frank B. Berry, Assistant Secretary of Defense (Health and Medical), developed his plan for deferment of individuals for the current and the next fiscal years. The numbers which are being deferred under this plan are not sufficient, in my opinion, to make available to us the professional competence which will be required.

The employment of civilian physicians is being exploited, even though this can help to solve only a part of our shortage problem. Recent increases in salary levels and more concerted recruitment have increased the number employed to 300 full-time equivalents. This actually represents a far greater number of civilian doctors utilized on a part-time basis. We hope to increase the number and the quality employed.

The impending shortage of specialists in the Army puts additional emphasis on our professional training program for the future. The most important factor in the high standard of our patient care in recent years is the increased professional competence of our military medical officers. The value of sound professional training programs emphasized by Kirk, Bliss, and Armstrong has been proved in dividends to our patients, to our doctors, and to the Army Medical Service. Our present professional training programs are geared to accomplish several purposes: to provide for our officers opportunities for continuity of training and education; to create for them programs by which they can acquire specialist training and keep abreast of recent medical advances; to maintain the high quality of medical care in the Army; and to attract career Medical Corps officers. I propose to retain these objectives.

### TRAINING PROGRAMS

In order to accomplish these objectives we have placed major emphasis not only on our residencies and our intern program but also on what we consider an excellent postgraduate education program. I should like to outline briefly for you these programs and some of the problems associated with them.

Our residency program now covers 22 specialties. Residencies are being conducted at four of our major teaching hospitals in this country—Walter Reed, Brooke, Fitzsimons, and Letterman—and at Tripler in Hawaii. Internship programs are conducted at these, and at Valley Forge, Madigan, and Beaumont. Oppor-

tunities for residency training are afforded only to Regular Army officers. Although it is true that a Regular officer may resign from the service upon completion of his obligatory service, we hope that additional incentives will result in an increasing number electing to make the Army their career. The success of our residents in obtaining board certification has been most gratifying.

Like most teaching hospitals, we are oversubscribed in certain specialties and undersubscribed in others. The question is frequently raised as to whether or not our residency training in the specialties should be opened to Reserve officers. Recently we submitted to the Department of Defense a proposal to admit Reserve officers to our programs with the proviso that they be required to pay back an extra year above that required of the Regular officer. The proposal is currently under consideration in the Office of the Secretary of Defense. I think you will be interested to know, too, that on 1 September we started a two-year general practice residency at the U. S. Army Hospital, Fort Knox, for Reserve officers.

The Army Internship Program has proved to be an increasingly attractive one. Our primary objective in establishing this program, of course, is to interest these interns in a career as a Regular Army Medical Corps officer. That the program has succeeded only to a moderate degree in this respect is evidenced by the fact that only 44 out of 149 interns in our last class have been approved for commission in the Regular Army. We must do a better job of selecting interns who are motivated for the Army and a better job of selling them on the Army while they are interns.

Other postgraduate training for Medical Corps officers functions in two forms—the in-service short course program and the civilian institution program. Our teaching hospitals have always taken great pride in conducting such courses as the Kinbrough Urological Seminar, Symposium on Pulmonary Diseases, Recent Advances in Internal Medicine, Obstetrics and Gynecology Seminar, and many others. These courses have proved popular not only among service officers but to many civilian physicians as well.

The civilian institution program was created to provide training at universities throughout the country that could not otherwise be obtained by in-service courses. Last year, 59 medical officers received training in civilian institutions in courses varying from two days to 12 months.

#### HOSPITAL FACILITIES

The quality of medical care can be maintained only by achieving an acceptable standard for every factor contributing to it.

One of the weak links in this chain has been the physical inadequacy of our hospital plants to meet the requirements of modern efficient hospital operation. Many of our hospitals are not only in poor physical condition but were designed for a size and type operation which is radically different from the current situation. A replacement program for hospital facilities is necessary and has been started. The first increment was authorized in 1952 when funds were appropriated for seven permanent type hospitals. An example of the type of structure is the 500-bed hospital on a 1,000-bed chassis. Six hospitals are now under construction—at Fort Knox, Fort Belvoir, Fort Bragg, Fort Benning, Fort Riley, and Fort Monmouth. The seventh hospital, at Fort Dix, is still in the design stage.

Additional hospitals were authorized and funds appropriated in the 1956 Public Works Program. These hospitals are at Fort Leavenworth and Fort Jackson. It is contemplated that two additional hospitals, at Fort Meade and Fort Ord, will be included in the fiscal year 1957 Public Works Program. These projects are now being considered by the Department of Defense. At last we can say that a progressive construction program is under way.

#### MEDICAL STAFF PROBLEMS

I should now like to discuss problems more directly related to our preparedness mission. The probability of employment of atomic weapons in any future major conflict requires that we re-examine the organization and doctrine of medical service in the field. In fact, the Chief of Staff has directed that such studies be undertaken with the view to improving the combat potential of the Army. In part, these studies have been pointed toward the determination of the type of support units and the optimum ratio of such units to combat units required to win a two-sided atomic war.

As a result of these studies, a new command and staff structure of the Army in the field is under development and being tested in maneuvers. I am particularly anxious to see that the position of staff surgeons is in consonance with provision of an effective medical service. If surgeons, as special staff officers, are not immediately available to the major tactical commander, but separated by an intermediate headquarters, then medical matters must go through the intermediate headquarters with resultant modification and delay. Delay in medical matters can prove costly in terms of patient care and lives. Regardless of changes in organizational or functional concepts, the mission of the Army Medical Service "to conserve the fighting strength" will remain unchanged, and we must make sure that the Army Medical Service in the field is organized in a manner to best facilitate effective accomplishment of this mission.



We must re-examine the functions, structure, and composition of our medical units to assure their suitability to meet conditions of modern warfare. We may have to modify some and, perhaps, create new ones. This is a task that will require effort to assure that we come up with the best answers and do it as soon as possible. Be assured that we are working on these problems. We have established a Medical Service Combat Development Board for the testing of field equipment and have re-established the Medical Service Board to work on long-range problems of organization and operation of the Medical Service.

With the expansion of Army aviation we must place increased emphasis on Army aviation medicine. We are now training aviation medical officers and assigning them to headquarters of divisions, corps, and armies, to certain major aviation battalions and groups, and on an area basis. This training is primarily in the Air Force School of Aviation Medicine at Randolph Air Force Base.

We must also re-examine the doctrine and, perhaps, organization of medical service support beyond the immediate theater of operations. We must do this with a view toward possible commitment in a local or limited conflict such as in Korea as well as preparedness for total mobilization. We must take into consideration not only the new weapons but the higher mobility of the Army, the increased speed of patient evacuation and similar factors. Experience with air evacuation in Korea has taught us that the continental United States hospital system must be prepared for much more rapid expansion during the first stages of conflict, and must be more sensitive to fluctuations in casualty rates than was required previously. Each aspect of preparedness must be re-examined in light of current thinking, and plans must be adjusted accordingly.

We must, of course, continually re-examine our training programs to assure that they reflect the latest doctrine and concepts of modern warfare. All our training and educational activities must include the military aspects of medicine. In our residency program we are now setting aside one hour a month for the purpose of conducting a conference on military medicine. We require, too, that a Medical Corps officer located at each teaching hospital, who has the proper military background and experience, be designated as the co-ordinator of military medicine and that he be given the responsibility for this program. The application of military medicine is being stressed on all teaching rounds.

#### MASS CASUALTIES

In keeping with our responsibilities for national preparedness, we are putting considerable stress on the handling of mass cas-

ualties. One of our courses, "Medical Care of Atomic Casualties," has become so well known to all the military services, as well as to such other agencies as the American Medical Association, the Public Health Service, the Federal Civil Defense Association, the National League for Nursing, the American Hospital Association, and other groups, that we have had to increase our quotas from an original 32 participants to 100, and from 4 courses a year to 6.

Another course of this type which was developed and conducted for the first time last year is "Surgery in Acute Trauma." This course, or rather series of courses, was conducted at all of our teaching hospitals. The scope and content of these courses include early management and transportation of wounded, a review of types of wounds, débridement, shock, problems in the administration of blood and blood derivatives, acute renal insufficiency in war casualties, perineal wounds, peripheral blood vessel injuries, and many other aspects of acute trauma.

Both the Army Medical Service School and the Walter Reed Army Institute of Research, as well as our hospitals, conduct a large number of courses for Medical Corps officers that are particularly designed to cover aspects of medicine applicable to national preparedness. I intend that we continue and expand our teaching programs in this direction and that we put increased emphasis on teaching the technics to be used in the care of mass casualties, not only to medical officers, but to dental officers, nurses, Medical Service Corps officers, and medical enlisted men.

In a nuclear war, medical personnel will not be available in sufficient numbers to administer emergency medical aid to the large numbers of casualties, and this task must, in many instances, be performed by nonmedical personnel. Limiting mortality and maintaining unit fighting strength must become a primary element of training for nonmedical military personnel and should be reflected accordingly in training programs of the Army.

We have asked that the period devoted to medical problems be increased from 5 to 22 hours in the soldier's 16 weeks' basic military training. The Department of the Army has concurred in this plan in principle but finds difficulty in adjusting the basic training program to allocate the required time. Regardless of how many hours are finally allocated to medical subjects, we intend that each soldier, in the absence of medical service advice and supervision, be able to administer self-aid or first aid as it pertains to the control of hemorrhage; prevention and treatment of shock; positioning and treatment of fractures; care and treatment of open wounds; treatment of burns; artificial respiration; positioning of casualties with wounds of the chest,

head, neck, spine, and extremities; and have a working knowledge of sorting and transporting casualties.

### RESEARCH

During peace, we must conduct research that will better prepare us to meet our responsibilities in war. We must not lose sight, however, that our responsibilities in war go far beyond front-line medicine. Our program must be broad in scope, involving both basic and applied research in fields which are immediately or reasonably related to the mission of the Army Medical Service. Needless to say, much of this research results in information which is as valuable and applicable to civilian medicine as to military medicine, just as much of civilian medical research has helped to improve the practice of medicine in the Army.

To conduct this research we have several installations which are specifically staffed and equipped. We also support clinical research at most of the named Army hospitals and the Army Area Laboratories and encourage such research at station hospitals where competent and interested personnel are available. We also support a rather large research program through some 380 contracts with universities and civilian hospitals covering 22 major areas. Much of our research is being directed toward four major causes of loss of military manpower. In the area of trauma the more important investigations are directed toward blood and fluid replacement, improved burn therapy, blood volume expanders, improved anesthesia, and vascular prostheses. In the area of communicable disease we are particularly concerned with respiratory disease, infectious hepatitis, enteric disease, virus and rickettsial disease, and immunization methods. As to radiation exposure, we are investigating biological dosimetry and radiation injury. Our research in psychiatric disorders is exploring the problems of stress, rapid treatment methods, and behavior problems. I believe that we have an effective research program. It will be continually evaluated to eliminate projects which are not important to military medicine and to emphasize projects in which the Army has a vital interest.

### MEDICAL INTELLIGENCE

*Our medical intelligence activities have broadened in scope and may have to be broadened still further. We cannot afford to continue to limit our medical intelligence efforts to preventive medicine aspects of military operations in foreign areas. Our responsibilities in the activities of the North Atlantic Treaty Organization, Southeast Asia Treaty Organization, and Inter-American affairs have placed on us the burden of becoming familiar with all phases of governmental and private medical*

administration, practice, research, and training, as well as health and sanitary conditions in these countries. It is only through understanding a country's capabilities that we can assess the manner in which we can best help it or how it can best help us in our mutual defense efforts.

### SUPPLY

Medical supply is an important factor in maintaining a high standard of medical care in both peace and war. For the first time we have a sizable reserve of supplies and equipment, valued at 97 million dollars, to lessen the impact of mobilization requirements. The major problem in the medical supply field at present is organizational. Despite the tremendous progress made in unifying medical supply operations of the three services, some proposals recently have been made which would, I believe, separate the control of medical supplies from the doctor, something which I consider neither desirable nor feasible, and which I will continue to oppose.

### PROGRAM FOR MEDICAL RESERVE UNITS

The medical reserve program is in need of rejuvenation. Reserve medical units are the muscle of our preparedness. Of a total of 247 authorized Army Medical Reserve Units, only 186 are on an active status. Of the major units, however, 8 out of 9 hospital centers, 5 out of 7 convalescent centers, and all 60 of the general hospitals are currently active. Of the Table of Organization and Equipment (T/O&E) strength, only 42 per cent of medical officers, 30 per cent of total officers, and 9 per cent of enlisted are on the rolls.

There are about 4,500 Medical Corps officers in the Reserve components today, not including those on active duty. Of these, about 3,700 are in the Ready Reserve, but only about 1,400 are participating in training activities.

The new Reserve Forces Act of 1955 has teeth only for the individuals appointed under age 26 and after 10 August 1955. Others can participate or not as they choose. Unless excused under Department of Defense regulations (which by the way are still being staffed) individuals in the Ready Reserve each year must serve two weeks of active duty plus 48 drill or training periods or alternately 30 days of active duty.

Our office has recommended that the regulations being processed contain the following statement: "Such an individual who is practicing a profession—for example, medicine—in which he will be using substantially the same skills in civilian life as he would be called upon to use in the military service may be permitted to participate to whatever lesser extent is

considered by the military department concerned to be necessary to maintain his military proficiency." If this is approved for inclusion in the Department of Defense regulations, we will recommend that the implementing regulations of the Department of the Army require a minimum of 15 drill periods per year plus two weeks of active duty for the professional complements of hospital units.

### RESERVE CORPS RECRUITMENT

I have discussed at length the problems of recruitment and retention in the Regular Corps. These problems are just as serious in the Reserve Corps. They do not seem as acute because the reserve components do not face the day-to-day problems of operation of a medical service nor care of the sick. Much of the personnel in both organizations is obtained through compulsion. For doctors, the immediate financial inducements of membership in the reserve are zero. Usually reserve activity means the doctor loses money even though he draws military pay for the time spent. The long-range financial inducement of retirement pay is, I believe, a definite factor in many cases, although probably more in the retention of men with considerable service rather than recruitment of new blood. The other inducement is patriotism or a sense of duty as a citizen. I believe that many doctors today sincerely consider that, in a major war, they can discharge their duty as citizens as well in civil defense activities as in a military unit. Furthermore, in peacetime civil defense requires very little time, and in wartime it probably means service in or near the individual's home community. This situation means tough competition for recruitment of doctors in the Reserve.

What can be done to put new life in our Reserve Program? First, I believe we should emphasize to the young man that during the compulsory period of Reserve Service, the officer can make a good start toward qualifying for retirement pay. We should do everything we can to ensure that the regulations that are promulgated provide that doctors of the professional complement of units do not have to attend the full 48 drill periods in order to be participating members of the units. Our Reserve Training Programs must be revitalized to emphasize those things which are important in *military* medicine, and yet are professionally oriented to capture the interest and enthusiasm of the doctor who is largely wrapped up in the practice of *civilian* medicine. Military surgery and the handling of mass casualties must be stressed as well as preventive medicine and psychiatry. In the last two years we have already made a start in this direction—but we must push further.

We should diversify our summer unit training. Recently, I have observed various types from the strictly tactical type of field training to the strictly clinical type of training in one of our large hospitals. I am convinced that each of our units should have a different type of training each summer, preferably at different locations. This will provide broader training and will stimulate interest. Recently, one of our Reserve general hospitals has requested that it do 30 days of active-duty training next summer in Germany. This suggestion is intriguing, and our office is going to give it careful study. In this day of air travel, I believe we should seriously explore the possibility of using large government transport planes to move, for example, a Massachusetts unit to Texas for two weeks' active duty, or a Texas unit to Colorado.

Recently, additional equipment for reserve medical units has been approved. We will push to see that it is issued during this and the next fiscal year.

The "Michigan Plan" has just been approved for a one-year trial in that state. This provides that general hospitals located in towns which are not large enough to completely support the unit may have satellite fragment units in adjacent localities. We shall watch this experiment with interest.

I should appreciate additional ideas and suggestions for revitalizing our Reserve Program.

#### CIVIL DEFENSE

I would like to mention our responsibilities with regard to civil defense. I personally believe that clarification of the role of the Army Medical Service in civil defense is one of the major problems requiring solution. Responsibility for civil defense by law is vested primarily in the several states and their political subdivisions. Yet, you will recall that in "Operation Alert" last June, the President promptly "proclaimed" martial law.

We in the Army Medical Service are vitally concerned with the problems of civil defense. We recognize that little distinction can or will be made between military and civilian casualties in the event of a nuclear attack on the United States. The civil defense problem is unsatisfactory in several respects. Fifty thousand casualties, to say nothing of eight million, present a problem taxing the imagination. Who will treat them, and where will they be treated? This involves people, transportation, facilities, and organization. The role of the Army in these areas is uncertain. How will they be treated? This involves medical principles and doctrine, and this is the area on which we are concentrating our work.

Some actions which have been taken and which are related to civil defense should be mentioned. We have developed plans at our various installations in the event of disaster or enemy attack, and have integrated these plans with local civil defense plans to the extent possible. I have mentioned previously our teaching programs which are in part directed toward the civil defense problem. We, with the Navy, Air Force, and United States Public Health Service, are sponsoring a "Medical Education for National Defense" program in a number of medical schools for the purpose of instructing medical students in the problems of national defense medicine. At present there are 15 medical schools participating in this program and it is planned that 10 more will be included next year. The Army Medical Service also sponsors a traveling instructional team which appears before medical societies, medical schools, and Army Reserve components teaching the handling of mass casualties.

We have published a technical bulletin on "Early Medical Management of Mass Casualties in Nuclear Warfare," which has been concurred in by both the Air Force and the Navy. It establishes doctrine, policy, and procedures for the early medical management of mass casualties in the medical services of the Armed Forces.

All Army Medical Service officer personnel, except Medical Corps officers, are required to take a 12-hour refresher course in emergency medical treatment. In all our courses in the Medical Service School at San Antonio, Tex., we are emphasizing the handling of mass casualties and the problems of nuclear warfare.

The Army Medical Service has had wide experience in handling casualties. Yet I would emphasize that we have never had any experience with mass casualties as we now conceive them; nor will we, except in a situation when the chips are down. We think we have some of the answers, but we know that there are many we do not have. We have a handful of men working on these problems; we should have 10 times as many.

#### SUMMARY

In summary, the double task of readjusting to a peacetime operation and improving our preparedness to support the Army either in a conventional or an atomic war presents many difficult problems.

Paramount is the need to rebuild the Regular Army Medical Corps. Without a strong, professionally qualified corps there can be little hope in achieving our objectives. This major problem is in itself composed of many individual problems—pay, promotion, assignment and rotation, prestige, and training—which must be attacked each in turn.

We must solve the family care problem not only to help us balance workload and resources, but to provide the flexibility that we need to direct our attention to the major mission of medical support of the Army in peace and war.

We must re-examine and improve the preparedness of the Army Medical Service in light of modern concepts of war. This involves research, doctrine, training, organization, our reserve program, and civil defense.

We must not overlook the less acute but equally important problems of the Army Medical Service. We must continue a sound construction program. We must improve utilization of manpower in the Army through better selection, elimination, and classification of personnel. We must not only maintain but improve our standards of prevention and treatment of disease and injury.

The program I have outlined is both ambitious and formidable but, considering mission and circumstances, no lesser goals can be established. It is a task that the Army Medical Service can hardly accomplish alone. But we are not alone. Our relationships with civilian medicine have never been better. Since World War II there has been a growing understanding and with it, strengthening of ties between civilian and military medicine. There now exists full appreciation throughout the medical profession, military and civilian, that as integral parts of the profession of medicine we are all working toward the same goal—to bring to the American people the best medical care possible—and that to achieve this goal we must work together. This meeting exemplifies this close relationship and promises continued co-operative effort between civilian and military medicine. With faith in the ability and dedication of the men and women of the Army Medical Service and our compatriots in civilian medicine, I feel confident that our goals will be achieved.

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Undoubtedly the greatest stimulus to progress in health care and hospitalization in Korea since its liberation is military medicine. Most physicians of the ROK Armed Forces have a limited private practice. This is true, too, of the physicians in public health jobs. Most of the military physicians are potential fulltime civilian practitioners sooner or later. As they associate with Western-trained physicians in their military capacities, their professional knowledge is furthered and their potential in the practice of modern medicine is increased.

—JAMES T. RICHARDS, Lieutenant Colonel, MSC, USA  
in *Hospitals*, p. 98, Oct. 1954



# MEDICAL EDUCATION FOR NATIONAL DEFENSE

## Progress Report

The MEND Program was described in the October 1955 issue of this *Journal* as a means of supplementing medical curricula with additional information that might contribute to effective service by the medical graduate in time of national emergency. As of 1 January 1956, 10 more medical schools had joined the Program. These are Temple, Maryland, Duke, Louisiana State, Michigan, Pittsburgh, Washington (St. Louis), Kansas, California (Los Angeles), and New York University. In addition to the 25 schools in full affiliation with MEND, 7 other schools are participating without, at this time, receiving any financial assistance.

Activities sponsored by the MEND Committee for the spring semester include the following symposia:

### INFECTIOUS DISEASE PROBLEMS

This symposium, to be held at Great Lakes Naval Training Center, Chicago, Ill., on 14-16 February 1956, is designed to bring to the attention of professors of public health, preventive medicine, bacteriology, internal medicine, and pathology the communicable disease problems encountered by the military services. The program will include formal papers, group discussions, and visits to the laboratories of Naval Medical Research Unit No. 4. The Navy is primary sponsor of the symposium, with participation of Army, Air Force, Public Health Service, and medical faculty personnel.

### RADIOBIOLOGY

Walter Reed Army Institute of Research, Washington, D. C., will be host to this symposium on 9-11 April 1956. Problems arising from human contact with all types of radiation and radioactive materials will be taken up in papers and panel discussions that will cover acute and chronic aspects of radiation disease from flash burns to genetic effects. Further discussion will be concerned with medical problems expected to appear from increasing use of nuclear reactors in civilian enterprise and in military operations. The Army is primary sponsor, with participation by other agencies of the Government and by faculty members.

Medical officers of the Armed Forces are invited to attend these symposia on a space-available basis. Any officer interested in further details should contact the National Coordinator, MEND Program, Bureau of Medicine and Surgery, Department of the Navy, Washington 25, D. C.



## Clinicopathologic Conference

U. S. Naval Hospital, San Diego, Calif.\*

### MELENA, FEVER, AND PAIN

**Summary of Past Clinical History.** A 69-year-old retired naval officer was first admitted to the hospital as a medical emergency, having had a sudden episode of hemorrhage from the bowel. He had been retired in 1947 because of glaucoma. On the morning of admission, he vomited blood and passed a black stool. He became quite weak but did not complain of pain. In 1935 the patient had a somewhat similar episode and examination revealed a duodenal ulcer. A gastroenterostomy was performed, and the patient had received no medication since that time.

### FIRST ADMISSION

**Physical Examination.** The patient was a well-nourished, well-developed, co-operative male in no acute distress, but appearing pale and weak. The blood pressure was 112/70 mm Hg; the pulse was 100 per minute. There were no other significant findings except for a hemoglobin of 9.3 g per 100 ml; hematocrit, 30 ml per 100 ml. White blood cell count was 7,000 per  $\mu$ l with a normal differential. Urinalysis and serologic tests were negative.

**Course in Hospital.** There was a consistent, daily, intermittent fever. A whole blood transfusion elevated the hemoglobin to 10 g per 100 ml. At no time did he complain of pain and there was no recurrence of vomiting. The black stools persisted for two or three days and then the patient became constipated. Mild laxatives were necessary to relieve the constipation. His febrile course was significant in that every 24 to 48 hours he would have a shaking chill, and the temperature would range to 103° or 104°F and then subside. These febrile episodes were not associated with any pain or distress. Febrile agglutination tests and repeated blood smears for malaria studies were negative. White blood cell count was 17,900 per  $\mu$ l, with 78 per cent segmented neutrophils, 7 per cent band neutrophils, and 15 per cent

\*Rear Adm. Robert M. Gillett (MC) USN, Commanding Officer. From the Pathology Service, Capt. John S. Shaver (MC) USN, Chief.

lymphocytes. Stool examinations were negative for pathogenic protozoa. After approximately six days of chloroquine phosphate therapy, there was no apparent improvement or change in his febrile state, and the patient was given a combination of penicillin and streptomycin sulfate. Blood cultures prior to this antibiotic therapy were consistently negative. Following penicillin and streptomycin sulfate therapy, the patient's fever rapidly subsided and he became afebrile. His immediate course in the hospital was also complicated by intractable hiccoughs which lasted about 10 days.

Gastro-intestinal studies with contrast medium were reported positive for a large duodenal ulcer. Gall bladder studies with intravenous dye revealed a faint gall bladder outline.

The patient's subsequent course of hospitalization was uneventful. He became ambulatory, felt very well, slept well, and was troubled only with a mild intermittent constipation. He was discharged from the hospital in an asymptomatic state to be followed as an outpatient.

#### PRESENT ADMISSION

The patient was readmitted to the hospital 26 days later complaining of severe pain in the right sternoclavicular joint, fever, excessive sweating, and thirst. The pain was described as being severe, constant, and sometimes "throbbing" in character. His fever began four days prior to his readmission and was associated with drenching night sweats. There was no headache and no other joints were involved.

**Physical Examination.** The patient was an alert, active, apprehensive white man with a florid complexion and a warm, moist skin. Temperature was 101.8°F; pulse, 110, regular; blood pressure, 120/85 mm Hg. An electrocardiogram revealed only a sinus tachycardia. The cardiac impulse was visible over the whole left chest. Findings of an abdominal examination were not remarkable. There was no edema or vein distension.

**Laboratory Studies.** At this time the red blood cell count was 3.5 million per  $\mu$ l; hematocrit, 33 ml per 100 ml; white blood cell count, 10,600 per  $\mu$ l, with 73 per cent segmented forms, 2 per cent band forms, and 25 per cent lymphocytes. Urinalysis showed 10 mg of albumin in a random sample; blood urea nitrogen was 10.3 mg per 100 ml. Blood cultures were negative. Radiographs of the chest showed a moderate elevation of the right hemidiaphragm with only 66 per cent range of normal excursion. Two large discoid densities were present in the right lung base, one in a posterior position and the other situated anteriorly (fig. 1). A gastro-intestinal roentgenogram and fluoroscopic study showed an "active duodenal ulcer." The gastrojejunostomy was reported as functioning normally (fig. 2).



*Figure 1. Roentgenogram of the chest, showing elevation of right hemidiaphragm and two large discoid densities in the right lung base.*

**Course in Hospital.** Treatment consisted of thorazine (brand of chlorpromazine hydrochloride), luminal (brand of phenobarbital), and chloroquine phosphate. The fever, shaking chills, and right shoulder pain continued. On the 10th day of his second hospitalization a bronchoscopic examination showed no abnormal findings except for a moderate mucosal pallor. The abdomen was soft, and no palpable masses were evident on physical examination. A short time after the bronchoscopic procedure, the patient's blood pressure suddenly dropped to 96/48 mm Hg. The pulse rose to 140 per minute, and respiration became shallow with a rate of 40 per minute. The temperature was elevated to 105°F. Physical examination showed dullness, decreased breath sounds, and coarse rales over the right lower lung field with clinical signs of elevation and splinting of the right diaphragm. There were some decreased breath sounds over the left lower lobe, but no rales or dullness to percussion. On the following day re-examination revealed absent breath sounds on the right side of the chest with marked tenderness over the posterior area of the right chest wall. A roentgenogram revealed massive pleural effusion

of the right side with approximately 40 per cent collapse of the right lung. On the evening of the same day, the patient became very dyspneic, lapsed into coma, and died.



Figure 2. Gastro-intestinal roentgenogram, showing an "active duodenal ulcer."

#### DISCUSSION

Doctor Sheppard:\* In view of the history and clinical findings in this case, we must consider the probability that the patient did have a subdiaphragmatic abscess. Presumably, the terminal episode represents a very good possibility of a rupture of a subdiaphragmatic abscess into the right pleural space with a resulting empyema and massive compression pulmonary atelectasis. A chronic duodenal or gastric ulcer with lesser peritoneal cavity adhesions could silently rupture into the upper abdomen and result in a subdiaphragmatic abscess, and could burrow through the right hemidiaphragm to produce a massive purulent effusion into the right pleural space. There are many lesions other than ulcer that could result in an infection in the upper abdominal area and produce the same course of events. A suppurative cholecystitis with rup-

\*Lt. Haynes W. Sheppard (MC) USNR, Thoracic Surgery.

ture or infection from the stomach via lymphatic or blood stream could result in a subdiaphragmatic abscess; however, this would be less likely than direct extension from involved viscera. This patient had a gastroenterostomy, in addition to his ulcer, as indicated by radiographs and by the clinical history, and it is quite possible that a marginal ulcer existed with perforation, resulting in a diaphragmatic abscess. Occasionally, a fulminating appendicitis with rupture may extend retroperitoneally into the right subdiaphragmatic space and produce the same clinical picture. One possibility that comes to mind in reference to a thoracic problem that could result in a rapid demise of a patient, as appeared to be the situation in this case, is the spontaneous rupture of the esophagus. However, I think this possibility can be excluded in view of the fact that the mediastinal emphysema usual in such cases was not apparent in this case. Also, ruptures of the esophagus, with the usual complications, are predominantly on the left side rather than in the right pleural space. An acute fulminating pneumonia with effusion could produce symptoms as rapidly as we have here, with sudden demise of the patient. I think that obscure malignancies of the pancreas, stomach, duodenum, or any of the upper abdominal organs with rupture and infection in the retroperitoneal space could well produce symptoms similar to those present in this case. If I were called upon to make definitive diagnosis, based upon clinical history, signs, and symptoms I would say that the patient had a rupture of a duodenal ulcer with formation of a subdiaphragmatic abscess and subsequent perforation of the diaphragm with spilling of the purulent material into the right pleural space. May we look at the roentgenograms?

Doctor Wulfman:\* Many radiographs were taken. The gastro-intestinal series made upon the patient's first admission show a functional gastrojejunostomy. The duodenal cap is not filled out, but appears defective. The emptying time of the stomach and duodenum was a little more than five hours. No marginal ulcer is evident at the site of the gastrojejunostomy. A repeat gastro-intestinal series during the latter part of the patient's first admission was done, and we failed to find any lesions except for the defect previously described in the duodenum. On the first day of the patient's second hospitalization, two radiographs of the chest showed elevation and a fuzzy contour of the right diaphragm. This suggests some pleural reaction. Also some atelectasis of the right lower lobe is evident. A portable film made shortly before the patient died shows a paradoxical motion as well as limitation of excursion of the dome of the right diaphragm. Radiographs of the gall bladder with radiopaque dye contributed nothing significant. In conclusion, we were looking for a lesion in the stomach to account for a presumed subdiaphragmatic abscess. Numerous spot films were taken of the upper gastro-intestinal tract, and we are unable to find any lesions other than the defective duodenum, which was known to have been present from the beginning of the patient's illness. Our radiographic impression

\*Comdr. William A. Wulfman (MC) USN, Radiology Service.

are: gastrojejunostomy with no associated abnormality; active duodenal ulcer; right subdiaphragmatic abscess with paresis of the diaphragm; massive pleural effusion, right; and compression atelectasis, right lung.

**Doctor Davis:**\* I followed this patient on the ward and would like to add something that might be helpful to the history, which is not quite complete. It was my considered opinion, after examining him, that this patient had a subdiaphragmatic abscess. We entertained all of the possibilities as to the cause of a subdiaphragmatic abscess. Inasmuch as he had had duty in widespread areas of the world, it was believed that amebiasis might constitute a reasonable explanation for the elevated diaphragm and for the septic type of clinical course. Repeated stool examinations were negative for *Endamoeba histolytica*; however, because of the seriousness of his illness, the patient received treatment for amebiasis for six days. This failed to influence the clinical picture. Upon his first admission, our first problem became one of nursing because of intractable hiccoughs. As you know, intractable hiccoughs at this age is usually an ominous symptom, and we were of the opinion that this patient was quite seriously ill for a considerable period of time. He received combined penicillin and streptomycin sulfate therapy for at least two weeks. The hiccoughs ceased, the fever slowly subsided, and the patient became asymptomatic. He was discharged from the hospital because he desired to go to his home and because he felt well. He was seen in the outpatient department once a week and was asymptomatic.

Twenty-six days after discharge from the hospital the patient was readmitted because of shaking chills and a septic type of temperature. This second episode began to develop two days prior to entrance to the hospital. We thought of the possibility of a posterior perforation of his duodenal ulcer. However, in my experience, it is unusual to have a posterior duodenal ulcer rupture without some clinical signs, at least some pain. This patient had no pain and no evidence of abdominal rigidity. Repeated gall bladder studies revealed a functioning organ without evidence of calculi. A diagnosis of acute pyelonephritis with complications was entertained; however, this was excluded as a causative factor in view of the negative pyelograms and urinary studies.

**Clinical diagnoses:**

1. Duodenal ulcer, perforated
2. Subdiaphragmatic abscess, right
3. Pleural effusion and pulmonary atelectasis

**Dr. Sheppard's diagnoses:**

1. Chronic duodenal ulcer, perforating type, lesser peritoneal cavity
2. Subdiaphragmatic abscess with perforation of right hemidiaphragm
3. Empyema, right, with compression type pulmonary atelectasis

\*Comdr. George M. Davis, Jr. (MC) USN, Medical Service.

## PATHOLOGIC FINDINGS

Doctor Bench:\* At autopsy, 1,000 ml of thick, purulent exudate was found in the right pleural cavity. The right lung was collapsed and covered by a similar fibrinopurulent material. No abscesses or areas of consolidation were evident in the lung parenchyma. A perforation with ragged edges, measuring 4 cm in diameter, was present in the dome of the right diaphragm, and this communicated with the pleural cavity above and with a large subdiaphragmatic abscess below. The liver parenchyma was not involved. However, there was indentation of the diaphragmatic surface of the organ by the large abscess between the liver and the diaphragm. Exploration of the gastro-intestinal tract showed a normal esophagus. The stomach was distended with chyme, and arising from the posterior wall of the midfundal area was a large, gray-pink, lobulated, moderately firm tumor mass which measured 10 by 7 cm. Approximately one fourth of the tumor extended into the lumen of the stomach, while the greater portion extended posteriorly into the lesser peritoneal cavity. The lesion appeared to be originating in the muscle coats of the gastric wall (fig. 3). On the mucosal surface,



Figure 3. Cross section of gastric lesion, showing the nonencapsulated, lobulated structure. The dark, mottled, or mosaic pattern of the cut surfaces is due to hemorrhage and necrosis.

\*Lt. Robert K. Bench (MC) USN, Surgical Service.



the lesion produced a "volcanic" type mass with a central crateriform ulceration which measured 2 cm in diameter and approximately 3 cm in depth. The edges or borders of the ulcer were ragged; the ulcer extended deeply into the mass, and was partially filled with necrotic and bloody material. An area of hemorrhage measuring 4 cm in diameter was present in the central portion of the tumor mass. There was no evidence of perforation of the ulcer into the lesser peritoneal cavity; however, fibrinous and fibrous adhesions extended between the serosa covering the lesion and the wall of the lesser peritoneal sac.

The gastrojejunostomy was patent and apparently had been functioning properly. No marginal ulcers were found, and careful examination of the duodenum showed no evidence of mucosal ulceration. No tumor masses other than the large gastric lesion were found. The liver, except for the depressed parenchyma beneath the subdiaphragmatic abscess, was not unusual. The gall bladder appeared normal. Microscopically, the large gastric neoplasm was composed of uniform, interlaced bundles of smooth muscle cells. Mitoses were very rare, and there was no evidence of hyperchromatism of the cells. Focal areas of necrosis were common in the central portion of the tumor along with extensive areas of hemorrhage. No distinct capsule was evident about the tumor mass. Several histologic stains, including hematoxylin-eosin, Masson's trichrome, and phosphotungstic acid-hematoxylin preparations, were carried out, and the microscopic features were characteristic of a leiomyoma (fig. 4).

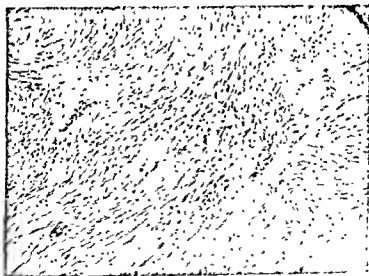


Figure 4. Photomicrograph of section of leiomyoma of gastric wall, showing proliferating, spindle-shaped smooth muscle cells that are fairly uniform in size and tend more or less to align in a palisade type configuration. ( $\times 180$ )

Although no sinus tract could be found between the gastric lesion and the right subdiaphragmatic area, it is assumed that the subdiaphragmatic abscess was secondary to an inflammatory process which had its beginning in the gastric ulcer overlying the leiomyoma. The gastric ulcer apparently resulted from pressure necrosis or ischemia of the gastric mucosa by the unusually large leiomyoma, with subsequent erosion and extension of the inflammatory process into the deeper layers of the tumor. Both fibrinous and fibrous adhesions extended from the serosal surface of the tumor in the lesser peritoneal cavity, and it is probable that the infection reached the right diaphragm via this route.

In conclusion, I might add, that although the leiomyoma is probably the most common of benign gastric lesions, it is definitely uncommon for these tumors to become large enough to produce symptoms.

#### Anatomic diagnoses:

1. Leiomyoma, gastric (posterior; midfundal), with necrosis, hemorrhage, and ulceration
  2. Abscess, subdiaphragmatic, right, with perforation into right pleural space
  3. Empyema, right (1,000 ml)
  4. Pulmonary atelectasis, right, compression type
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#### SKEPTICISM IN THERAPEUTICS

One should not be unreceptive to new ideas, but as Osler suggested, one should hold an active skepticism toward new methods and new agents. Simply because some investigator has made a glowing report of the effectiveness of an agent does not always lead to the fact that others can obtain the same effect. This is no reflection on the writer or his scientific honesty or ability. Rather, it is the recognition that enthusiasm at times may color judgment. It has been said that the effectiveness of the therapeutic agent is often proportionate to the personality of him who gives it.

—WILLIAM H. GORDON, M. D.  
in *Texas State Journal of Medicine*  
p. 693, Oct. 1954

### Cushing's Syndrome Treated By Bilateral Total Adrenalectomy

JACOB F. SCHIRMER, *Major, MC, USA*  
TIMOTHY N. CARIS, *Captain, USAF (MC)*  
WARNER F. BOWERS, *Colonel, MC, USA*  
ROBERT E. BLOUNT, *Colonel, MC, USA*

CUSHING'S syndrome, a rare malady occurring predominantly in young women, is a metabolic disorder manifested by moon facies, buffalo type adiposity, hyperglycemia, and impaired glucose tolerance, hirsutism, amenorrhea, muscular weakness, osteoporosis, acne, purplish striae, and, frequently, hypertension. Cushing<sup>1</sup> originally attributed this clinical picture to overactivity of the basophilic cells of the pituitary gland and believed that the causative lesion might be basophilic adenoma of the pituitary gland. He recognized, however, that primary adrenocortical hyperfunction could produce the same clinical picture.

Basophilic adenomata are not always accompanied by the characteristic signs and symptoms of Cushing's syndrome, and in the majority of cases of this malady, no evidence of basophilic adenomata have been found. All the manifestations of this syndrome can be explained on the basis of excessive adrenocortical activity. Basophilic adenoma of the anterior pituitary, hypothalamic lesions, functional neoplasms of the adrenal cortex, and hyperplasia of the adrenal cortex have been found, in different patients, to produce the clinical picture of this entity. Hyperplasia of the adrenal gland is the most commonly incriminated lesion.

The pathologic physiology of Cushing's syndrome and the management of a patient treated at this hospital by bilateral, total adrenalectomy are discussed in this article.

#### PATHOLOGIC PHYSIOLOGY

The exact basic mechanism involved in this syndrome is not known. The manifestations of the syndrome, however, are known to be associated with overproduction of the adrenocortical hormones and result from abnormalities of the hypothalamic-anterior pituitary-adrenocortical system. It seems reasonable to assume that the mechanism of production of Cushing's syndrome is not always the same. Lesions of the hypothalamus may produce excessive stimulation of

From Brooke Army Hospital, Fort Sam Houston, Tex.

the anterior pituitary gland, resulting in overproduction of adrenocorticotrophic hormone, bringing about adrenocortical hyperactivity. Functional basophilic adenomata of the anterior pituitary gland with overproduction of adrenocorticotrophic hormone likewise would cause adrenocortical hyperactivity and the same clinical picture. Functional neoplasms and primary hyperplasia of the adrenal cortex also result in hyperadrenocorticism. The high incidence of hyperplasia of the adrenal cortex in patients without pituitary basophilism indicates that Cushing's syndrome results from overproduction of adrenocorticotrophic hormone and direct overstimulation of the adrenal cortex. Increased susceptibility of the adrenal cortex to stimulation by the adrenocorticotrophic hormone must also be considered. In any event, whatever factors may exist in Cushing's syndrome, the final picture is of adrenocortical hyperfunction.

In a simplified concept of adrenal cortical function, three groups of hormones may be considered<sup>2</sup>: (1) the glycogenic, (2) the electrolyte-controlling, and (3) the androgenic and estrogenic steroids. In Cushing's syndrome the glycogenic steroids, predominantly, are produced in excess. These steroids (11-oxysteroids) bring about increased gluconeogenesis, protein antianabolism, glycogen storage, and inhibition of the action of insulin. The antianabolic effect on tissue protein results in the appearance of osteoporosis, thinning of the skin, striae, and muscular weakness. The increased gluconeogenesis, excessive glycogen storage in the liver (leading to glycogenolysis), and inhibition of the action of insulin result in impaired glucose tolerance and hyperglycemia. This form of diabetes, of course, is resistant to insulin therapy.

The electrolyte-controlling steroids (desoxycorticosterones) are not controlled by corticotrophic stimulation, but rather by levels of serum electrolytes. They cause increased sodium resorption by the renal tubules and thereby retention of water, and the increased excretion of potassium. This may be the mechanism of the hypertension that is observed in some patients with Cushing's syndrome. Because the production of this hormone is not dependent on stimulation by adrenocorticotrophic hormone, its formation in excess in some cases of Cushing's syndrome (other than in cases of functional adrenocortical neoplasm or primary adrenal hyperplasia) is not entirely understood. The glycogenic hormones, however, also have some influence over sodium retention and potassium loss, and are probably responsible for the development of hypertension in these patients.

The production of the androgenic and estrogenic steroids (17-ketosteroids) is dependent on stimulation by adrenocorticotrophic hormone. When produced in excess, these hormones produce hirsutism and amenorrhea in the female and impotence in the male.

The explanation of the development of buffalo type adiposity and moon facies is unknown. The adrenal cortex may produce another, as

yet unidentified, substance that affects fat metabolism or storage. These phenomena may also be secondary to a disturbance of fat metabolism secondary to the known disturbances of carbohydrate and protein metabolism.

### CASE REPORT

A 29-year-old man was admitted to this hospital on 15 March 1954 complaining of frontal headaches and recurring ankle edema of about two years' duration. During a routine physical examination in 1952, he had been found to be hypertensive and was hospitalized. Blood pressure during that hospitalization varied from 120/80 to 170/120 with an average of 160/110 mm Hg. Glucose tolerance tests, liver function tests, excretory urogram, and electrocardiogram at that time were within normal limits. The following year the patient was again hospitalized. Blood pressure was recorded as high as 180/140 mm Hg. Occasional traces of albuminuria were noted, and 24-hour 17-ketosteroid excretion varied from 27.2 to 48.4 mg per 100 ml. Excretory urograms were again found to be within normal limits.

On admission to this hospital, blood pressure was 170/126 mm Hg. The face was moon-shaped, and slight exophthalmos was present along with moderately severe acneiform skin rash over the face, back, and chest. There were many ecchymotic areas on both lower extremities, and prominent purple striae were noted over both hips. The patient's weight was 178 pounds and had been maintained at this level by rather rigorous dieting, his previous weight having been 207 pounds.

A white blood cell count was 24,300  $\mu$ l with 80 per cent polymorphonucleocytes. Four-hour Thorne test revealed a drop in total eosinophil count from 150 to 0 after administration of adrenocorticotrophic hormone. Urinary 17-ketosteroids were 42.6; 11-oxycorticoids, 4.46; and 17-hydroxycorticoids, 17.6 mg per 100 ml per 24 hours. After a three-day course of 20 units of corticotropin (ACTH) intravenously daily, the urinary 17-ketosteroids rose to 68 mg per 100 ml per 24 hours; 11-oxycorticoids were 5.5; and 17-hydroxycorticoids were 3 mg per 100 ml per 24 hours (fig. 1). Fasting blood sugar

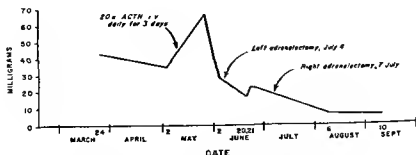


Figure 1. Twenty-four-hour urinary 17-ketosteroid excretion.

February 1956)

as 130 mg and two-hour postprandial blood sugar was 200 mg per 100 ml. Roentgenograms of the skull and cervical, thoracic, and lumbar spine were reported normal. An excretory urogram with retroperitoneal air insufflation revealed some displacement downward of the left kidney by a mass in the adrenal area.

A diagnosis of Cushing's syndrome due probably to adrenal cortical hyperplasia was made, and on 4 June a total left adrenalectomy was performed. The gland was about one and one-half times normal size and histologic examination revealed adrenal cortical hyperplasia. The immediate postoperative course was very gratifying in that the patient's acne began to clear, the purplish striae began to disappear, and he began to lose weight. Urinary 17-ketosteroids dropped to 22.5 mg per 100 ml per 24 hours and the blood pressure gradually approached normal. After about two weeks, however, improvement ceased and the patient noted return of the acne, rise of blood pressure, and recoloration of the striae. On 7 July 1954, the right adrenal gland was totally removed, and this gland was found to be hyperplastic. Since that time his course has been entirely satisfactory. His weight is stable at between 160-164 pounds; the preoperative leg and ankle edema, striae, and acne have entirely subsided; and the blood pressure averages about 150/95 mm Hg (fig. 2). The dusky red color of his face cleared and the moon-face appearance disappeared entirely. Maintenance therapy consists of 25 mg of cortisone daily.

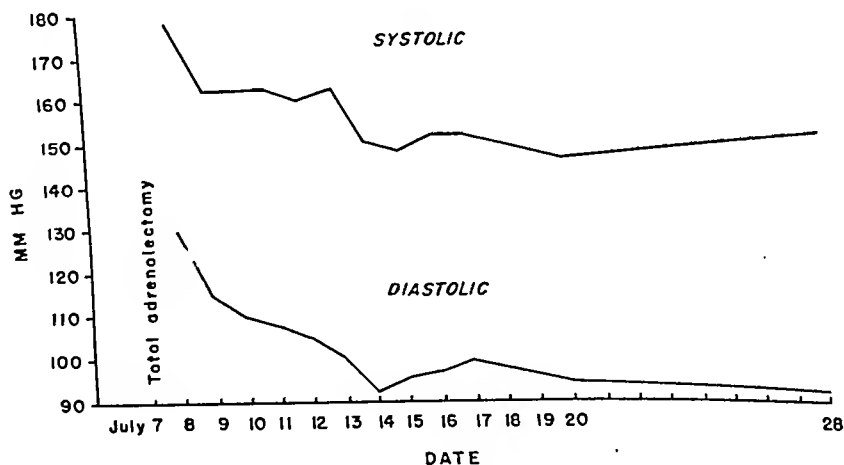


Figure 2. Blood pressure response following total adrenalectomy.

### DISCUSSION

Except for osteoporosis, this patient exhibited all the manifestations of Cushing's syndrome. Retroperitoneal air studies revealed only an enlarged left adrenal gland, even though the right and left adrenals were the same size. In an attempt to distinguish between neoplasm and hyperplasia, an ACTH test was performed (table 1).

It was thought that if adrenal neoplasm were present, the administration of ACTH would not significantly alter the total 24-hour urinary excretion of 17-ketosteroids and 11-oxysteroids because such a neoplasm functions independently of anterior pituitary control; whereas if hyperplasia were present, administration of ACTH would stimulate even more steroid production by the adrenal cortex. In this patient, ACTH administration produced an increase of 17-ketosteroids and 11-oxysteroids, suggesting the presence of adrenal hyperplasia. Jailer, Gold, and Wallace<sup>3</sup> recently evaluated a cortisone test for differentiation between adrenal hyperplasia and adrenal cortex neoplasia. Essentially the same principle is involved. The administration of cortisone inhibits adrenocorticotrophic hormone production. In adrenal cortical neoplasia, decrease in corticotropin produces no change in 17-ketosteroid urinary excretion, while in hyperplasia of the adrenal cortex, a decrease in 17-ketosteroid excretion occurs.

TABLE 1. ACTH test

Urinary steroids	Excretion in 24 hours	
	Base line levels	Levels after 3 days of 20 units ACTH intravenously
17-ketosteroids	42.6 mg	68 mg
11-oxycorticoids	4.46 mg	5.5 mg
17-hydroxycorticoids	17.6 mg	3 mg

The surgical approach to the adrenal gland may be transthoracic, transperitoneal, or extraperitoneal. We favor the extraperitoneal approach in most instances and it was used in this patient. Exploration of one adrenal gland allows rather accurate estimation of the condition of the other gland. If the exposed gland is small and hypoplastic, this is presumptive evidence that the contralateral gland contains primary cortical tumor. The finding of tumor in the first exposed gland, however, does not necessarily mean that tumor is not also present in the other gland. If the exposed gland is large and hyperplastic, the other gland is very probably also large and hyperplastic. Some authors advocate the removal of certain portions of hyperplastic glands or of all of the first explored gland and a portion of the remaining gland. The patient in these cases almost always either requires some form of maintenance therapy or is subject to recurrence of his disease. Sprague, Kvale, and Priestly<sup>4</sup> found that in virtually all cases the patients who did not receive maintenance therapy had recurrence of preoperative symptoms and signs. Experiences with totally adrenalectomized patients being treated for metastatic carcinoma of the breast will be reported by one of us (WFB) subsequently.<sup>5</sup> In view of the ease with which patients ordinarily can be man-

aged following bilateral total adrenalectomy, we believe that subtotal adrenalectomy, with the attendant risk of recurrence of disease, is inferior to total adrenalectomy for adrenal cortical hyperplasia.

Successful bilateral total adrenalectomies for Cushing's syndrome also have been reported by Sprague and associates and Abbott et al.<sup>6</sup>

### SUMMARY

A discussion of Cushing's syndrome, its manifestations and pathologic physiology has been presented. Successful treatment of a male patient with this condition by bilateral, total adrenalectomy is reported. We believe that because the productivity of residual tissue left after operation cannot be at all accurately ascertained at the time of operation, in order to cure the disease one must remove the entire adrenal gland. We believe that adrenalectomized patients ordinarily are not difficult to manage and that total adrenalectomy with postoperative cortisone administration is no more dangerous to the patient than is almost total adrenalectomy with cortisone management.

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In every illness there are periods when what the patient needs most is to be left in peace—not to be stirred up, even by sympathetic interest. And there are other periods when any help is desirable even if it means facing fairly severe strain or accepting pain. The general practitioner has to decide what the patient's requirements really are. He has to decide at his own peril and at that of his patient. For his solution of the problem of "when to start" has important consequences for the further development of the illness.

—MICHAEL BALINT, M. D.  
in *Lancet*  
p. 683, Apr. 2, 1955



# Congenital Toxoplasmosis

HOWARD A. PEARSON, Lieutenant (junior grade) (MC) USN

**T**OXOPLASMOSIS in human beings is a comparatively recently described entity. The genus *Toxoplasma* was established in 1909 by Nicolle and Manceaux<sup>1</sup> to include a microorganism which they discovered in the *gondi*, a North African rodent (*Ctenodactylus gondi*). Appropriately, they called their find, *Toxoplasma gondii*. The genus has only this one species including a number of parasites of warm-blooded animals throughout the world. The precise nature of the parasite is still controversial; however, by general agreement, it is included among the protozoa. *Toxoplasma* is an obligate parasite which lives in the tissue fluids and cells of the host. Only the erythrocyte is apparently not infected. Multiplication is by binary fission. The means of transmission of the parasite is uncertain. It is believed that rodents and birds constitute the reservoir; but as yet no vector has been identified.

The first confirmable report of human toxoplasmosis was written by Janku<sup>2</sup> in 1923 who described the ocular changes of chorioretinitis, and who demonstrated the parasite in the eye. In 1942 Paige, Cowen, and Wolf<sup>3</sup> proved prenatal infection by demonstrating the findings of disseminated toxoplasmosis in a hydrocephalic infant who was delivered after craniotomy. Recently, typical parasites have been demonstrated in the placenta of an infected infant.<sup>4</sup> The disease usually produces no symptoms in the mother. It has been shown consistently that mothers who produce affected children have high titers of complement-fixing and dye antibodies. The disease is more serious in younger patients; indeed the effect on the fetus is devastating. Congenital toxoplasmosis, though a rare disease, should be included in the differential diagnosis of certain frequently encountered signs and symptoms in pediatric practice. These are mental retardation, convulsions, blindness, hydrocephaly, or microcephaly.

## CASE REPORT

A nine-month-old infant was referred to this hospital for evaluation of blindness and retardation. She was the second child of a white mother and a Filipino father. The mother had a normal four-year-old son, and had had a three-month spontaneous abortion prior to the birth of the patient. The mother had always lived in the Washington area; how-

From U. S. Naval Hospital, Bethesda, Md.

ever, the father made several trips to the Caribbean area prior to and during the patient's gestation. Pregnancy was uneventful except for a few weeks during the second trimester. At this time, the mother had rather severe muscle aches and cramps and general malaise. She did not consult a physician about this, and the symptoms regressed spontaneously.

The child was born at term; birth weight was 4 pounds 13 1/2 ounces. The child was a moderate feeding problem, and several changes of formula were made. However, after a few weeks her general appearance, feeding, and weight gain were satisfactory. She was thought to be a normal child except that she was slightly "jumpy" and her stools were slightly increased in number. Blood counts and urinalyses in the nursery were normal.

Despite normal feeding and weight gain, it soon became apparent that the child was not developing normally. Virtually no progress was made in the motor sphere. At nine months she could not support her head steadily, sit, or turn over. Her eyes had never focused, and her parents had discovered her to be blind.

Physical examination revealed a chubby, placid female infant. Her weight was 21 3/4 pounds (75th percentile); she was 27 inches in length (30th percentile); her head circumference was 16 1/2 inches (less than 3d percentile). The anterior fontanelle was open and of normal size and turgor, and the sutures were not separated.

The eyes showed bilateral wandering motions, but not true nystagmus. The eyes did not move synchronously. There was a bilateral red reflex. The pupils were round but did not respond to light. The child did not blink when light or moving objects were directed at her eyes. She was thought to be totally blind. Funduscopically the vessels were normal and most of the retina was of normal color and pigmentation. The optic disks were dead white in color, showing typical optic atrophy. In the macular region bilaterally were punched-out areas, white in color, about one third the size of the disks. These lesions showed punctate pigment deposits.

Hearing was grossly intact. No teeth had erupted. The heart and lungs were normal. The liver edge was palpable three centimeters below the costal margin in the midclavicular line. No other organs or masses were palpated.

The child moved all extremities, and would withdraw these when stimulated. The deep tendon and abdominal reflexes were normal. There were bilateral extensor plantar reflexes. There was moderate rigidity of the lower extremity flexors. When the child was disturbed, she had clonic movements of the left arm and leg.

Complete blood cell count, serologic test for syphilis, and Vollmer tuberculin patch test were normal. Lumbar puncture demonstrated clear fluid under no increased pressure. This fluid contained 7 red blood

cells, 4 neutrophils, and 1 lymphocyte per  $\mu$ l. The sugar was 61; chlorides, 738; and protein, 60 mg per 100 ml.

Electrocardiographic findings were within normal limits for the age of the patient. The electroencephalogram showed generalized abnormality, with maximum slow activity over the left frontal and temporal regions. Roentgenograms of the skull showed extensive intracranial calcifications (figs. 1 and 2).

Roentgenograms of the extremities showed normal ossification centers for the child's age. No soft tissue calcification was noted.

Ventricular aspiration demonstrated clear fluid with 1 red blood cell, 2 neutrophils, and 1 lymphocyte per  $\mu$ l. The protein was 37.2 and the sugar was 44 mg per 100 ml. No organisms were demonstrated in the ventricular fluid.

Ventriculograms showed massive, symmetrical dilatation of the lateral and third ventricle with a block, probably in the region of the aqueduct of Sylvius (figs. 3 and 4).

The hospital course was uneventful, and the patient tolerated the various procedures well. It was believed that the patient's disease was inactive and that no medical therapy or chemotherapy was indicated. A neurosurgical consultant advised no surgical intervention for the hydrocephalus. Since discharge the patient's condition has not changed, and arrangements are being made for institutionalization.

### DISCUSSION

The classical features of the syndrome of congenital toxoplasmosis, namely, chorioretinitis, internal hydrocephalus, and intracranial calcifications, have been reported in many cases. The eyes and central nervous system appear extremely susceptible to the effects of the parasite. However, a parasitemia occurs during the disease, and in autopsy specimens the parasite has been demonstrated in the heart, muscles, and other viscera as well as the brain and eye.<sup>5</sup>

### PATHOGENESIS OF OCULAR LESIONS

The parasite is blood-borne to the eye, where granulomatous reaction and necrosis occurs. The early lesion is a localized area of retinal edema with a central umbilicated ulceration. As the edema regresses, the destruction of the choroid and retina becomes apparent and the underlying sclera shows through the destroyed layers of the choroid and the retina. Irregular pigmentation, heavier at the periphery, is then seen. The lesions tend to be bilateral and symmetrical; the macular areas are very frequently involved. The media is clear. Optic atrophy of the secondary type is often seen as a result of the increased intracranial pressure of the internal hydrocephalus. Depending on the degree

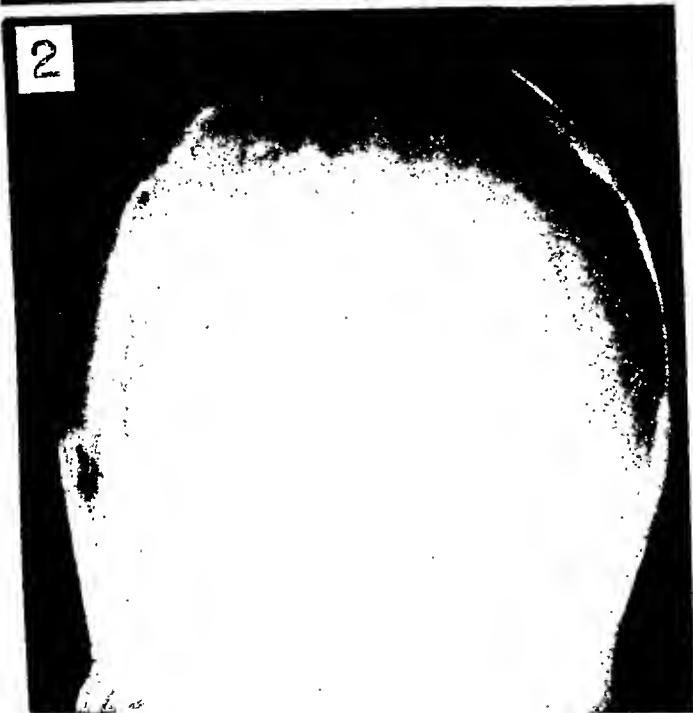
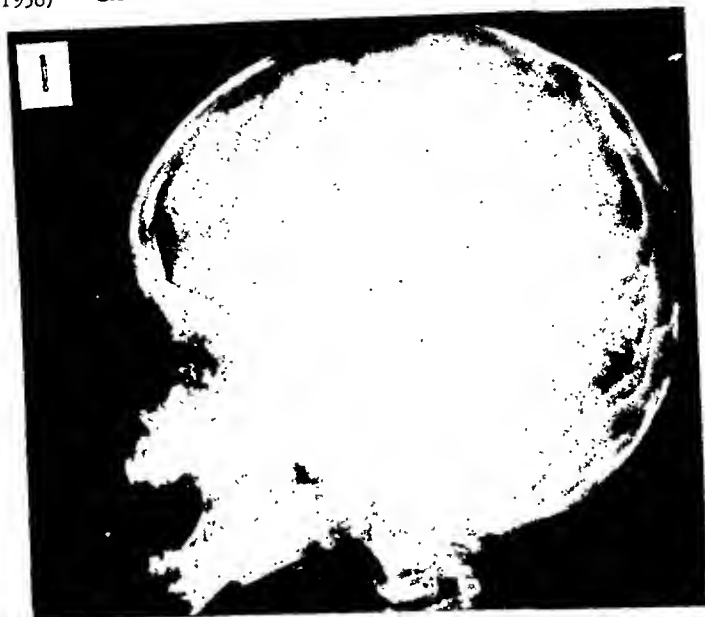
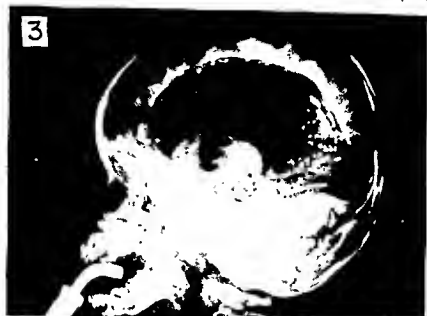


Figure 1. Lateral view of the skull showing extensive calcifications, the shape of which suggests that of dilated lateral ventricles. Figure 2. Posteroanterior view of the skull showing linear distribution of the calcifications. Symmetrical calcifications in the area of the basal ganglia and a large, thrombosed vessel are also noted.



*Figure 3. Ventriculogram demonstrating massive internal hydrocephalus with dilatation of the lateral and third ventricles. Figure 4. Posteroanterior projection showing typical periventricular distribution of calcifications.*

of retinal involvement, for the lesions of chorioretinitis can be extensive, and depending upon whether optic atrophy is present, the child may have some useful vision or be totally blind. Because of the frequent macular involvement, central vision is poor.

### PATHOGENESIS OF THE INTERNAL HYDROCEPHALUS

During the parasitemia, the organism enters and destroys many of the ependymal cells lining the ventricles. In the relatively large lateral and third ventricles, this causes only loss of continuity of the ependymal layer. However, in the narrow confines of the aqueduct of Sylvius, the inflammation, edema, and tissue necrosis often cause obstruction of the cerebrospinal fluid flow. Closure of the foramina of the fourth ventricle also is seen. This obstruction causes the internal hydrocephalus.

### PATHOGENESIS OF INTRACRANIAL CALCIFICATIONS

The intracranial calcifications of congenital toxoplasmosis are characteristically periventricular and diffuse. The cause of this distribution is speculative; however, Frenkel and Friedlander<sup>6</sup> suggested an interesting theory: The ventricular fluid in these patients has repeatedly been shown to be a potent source of toxoplasma antigen and often contains organisms. The ependyma, where intact, is impermeable to the cerebrospinal fluid. However, where ependymal destruction has occurred, fluid may seep into the surrounding brain tissue, facilitated by the increased intracranial pressure. As the antigen-rich fluid permeates the tissue, it encounters extracellular fluid. Because the antibody mechanism of the host has been stimulated, the blood and extracellular fluid contain free toxoplasma antibody. When the antigen-antibody combination takes place in the periventricular tissue, further inflammation and tissue necrosis occur. After the inflammation subsides, repair and calcification occur. Perivascular hemorrhage, vascular thrombosis, and infarction may also develop in the area.

### SUMMARY

A case illustrating the classical findings of congenital toxoplasmosis is presented. Chorioretinitis, internal hydrocephalus, and intracranial calcifications which are characteristic of this syndrome were present. It is suggested that congenital toxoplasmosis be included in the differential diagnosis when mental retardation, convulsions, blindness, hydrocephaly, or microcephaly are encountered. Fundusoscopic examination for chorioretinitis and roentgenographic examination of the skull for intracranial calcifications offer the most satisfactory means of establishing the diagnosis.

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## WHAT IS A G. P.?

"The first step . . . is to decide who is a general practitioner. This is not as easy as it appears. So wide is the field of general practice that to say a man is a general practitioner is not much more informative than to say that he is a surgeon. After much deliberation the [Canadian] College of General Practice arrived at the negative definition that 'he is a doctor who does not limit his practice to any one field of medicine.' A popular identification—flippant but descriptive—is: 'A general practitioner is an internist who does as much surgery as the hospital facilities, and his colleagues, will permit.'"

—H. G. HALL, M. D.  
in *Canadian Medical Association Journal*  
p. 90, July 15, 1955

# Cortisone in Treatment of Acute Pancreatitis Associated With Mumps Epidemic Parotitis

AUGUSTUS F. BLOODWORTH, *Captain, USAF (MC)*  
STANLEY L. COHEN, *First Lieutenant, USAF (MC)*

**P**ANCREATITIS associated with mumps (epidemic parotitis) is a recognized medical entity occurring frequently enough that early recognition and treatment is important in a serious and possibly fatal disease complication. The diagnosis is suggested by the appearance of epigastric pain, nausea, and vomiting, with associated tenderness on deep palpation. The most striking diagnostic laboratory finding is an elevation of the serum amylase.

The use of adrenal corticosteroids has been favorably reported in treatment of acute hemorrhagic pancreatitis.<sup>1,2</sup> The following is a report of a case of acute pancreatitis, associated with mumps, in which the use of cortisone was felt to be lifesaving.

## CASE REPORT

A 17-year-old airman was admitted to the medical service of this hospital on 18 April 1955, with a chief complaint of pain in the right parotid area with associated discomfort on swallowing for 1 day prior to admission.

The patient had had "mumps" on the left side at the age of 6. Physical examination on admission revealed a moderately ill white man who had definite swelling and tenderness over his right parotid gland and associated inflammatory changes around the orifice of Wharton's duct on the right. His temperature was 99.8° F. There were no other positive physical findings.

A diagnosis of mumps was made, and the patient was placed on strict bed rest, 5 mg. of diethylstilbestrol daily, sedation, and analgesics. Temperature elevations to 99.8° F. occurred daily during the first 3 hospital days. On the fourth day the patient developed a bilateral epididymitis, manifested by pain and tenderness over both epididymal areas, with associated temperature of 101.6° F. This was managed with ice bags to the involved area, and opiates for pain. Although the symp-

<sup>1</sup>Ann. N. Y. Acad. Sci., 1954, 6, 1-10.



toms improved on the fifth day, the patient's temperature was elevated to 103° F., and that evening this was accompanied by a vague pain in the upper abdomen. On the sixth day, abdominal pain was more severe and radiated through to the back. Examination revealed definite tenderness over the entire upper abdomen. The patient's temperature was 104° F. Nausea, vomiting, and flatulence ensued. Serum amylase was 80 Somogyi units (normal 20-40). A diagnosis of pancreatitis was evident. Treatment, consisting of gastric suction, intravenous feedings, and small doses of regular insulin, anticholinergics, and opiates, was instituted. Penicillin and streptomycin were administered parenterally. The patient seemed to be improving symptomatically, although his temperature remained elevated.

Late during the sixth hospital day the patient became very weak and appeared to be in shock. His rectal temperature was 105.6° F. and tachycardia (pulse 130) was present. Following this, the patient became stuporous and was placed on the dangerously ill list. His blood cell count revealed a leukocytosis with a shift toward immature forms. Blood cultures, liver function studies, serum electrolytes and blood glucose revealed no significant abnormalities.

Cool water enemas and spongings with alcohol were given without any significant temperature change. One hundred milligrams of cortisone was given intramuscularly, and followed with 50 mg. every 6 hours. By the morning of the seventh hospital day there was dramatic improvement. The patient was rational, feeling stronger, and his temperature was declining.

Later in the day the patient developed diffuse bronchospasm which responded to sedation, bronchodilators, and alveaire (brand of a detergent superinone) inhalations. His temperature became normal on the eighth hospital day. Cortisone was continued at a dosage of 50 mg. intramuscularly, every 8 hours, for 3 more days. Repeat serum amylase determination was 30 Somogyi units. By the twelfth hospital day the patient was ambulatory and feeling well, except for slight epididymal pain. On the eighteenth hospital day the patient was discharged on convalescent leave.

#### DISCUSSION

The serum amylase of most patients with epidemic parotitis is elevated during the first few days of illness. This is believed to be associated with the acute inflammatory process in the parotid glands rather than with an accompanying pancreatitis.<sup>9</sup> However, a serum amylase of twice normal value is pathognomonic of acute pancreatitis in the presence of signs and symptoms such as those seen in our patient. Although an anticholinergic drug, banthine (brand of methantheline bromide), and gastric suction afforded temporary relief, cortisone reverted a downhill course to one of recovery.

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## THE DOCTOR'S SKIN

The problem of industrial dermatoses is a major one, but no working man is exposed to more irritating or potentially sensitizing substances than the physician. It is not surprising that each year surgeons or obstetricians must find other fields of medicine into which to enter because their hands cannot tolerate the necessary scrubbing. Some promising trainees for private medical practice must direct their future planning toward administrative positions for the same reason. Much of this could be avoided if proper care is taken of the skin. . . . The doctor is prone to treat himself with all sorts of self-medication, which may be injudicious and sometimes actually harmful. Treat your skin kindly as you are going to need it for a long time.

—FRANK G. WITHERSPOON, M. D.

in *Journal of the Tennessee State*

*Medical Association*, pp. 400 and 403, Oct. 1954

## MEDICAL WISDOM

All the power of tongue and pen, and all the wisdom of textbook and lecture, can never teach a doctor the knowledge of when to probe and when to leave alone, when to chide and when to reassure, when to speak and when to keep silent. They are private mysteries with a different solution for every one of the million permutations of personality involved between a doctor and his patient.

—RICHARD ASHER, M. D.

in *Lancet*

p. 738, Apr. 9, 1955

## A MESSAGE FROM THE A. M. A.

The January issue of the *U. S. Armed Forces Medical Journal* carried the first in a series of articles to acquaint physicians in uniform with the organization, function, history, and purpose of the American Medical Association. Last month a brief history and the purpose of the Association were covered, as well as the membership requirements and types of membership.

The policy-making body of the Association is the House of Delegates which meets in June and December of each year. The Board of Trustees directs all activities of the Association between these meetings. The Secretary-General Manager supervises all activities of the councils, bureaus, and committees between meetings of the Board.

Thirteen standing committees serve the House of Delegates and Board of Trustees. Four councils report directly to the House of Delegates, and seven councils and two committees report to the Board of Trustees. Councils and committees are composed of from 5 to 18 physicians. Members are either elected by the House of Delegates or appointed by the Board of Trustees. Councils and committees decide policies on all activities under their jurisdiction, subject to approval by the Board of Trustees and the House of Delegates. Most councils and committees have a full-time staff at A. M. A. headquarters which implements their programs. Each staff is headed by a secretary. Those committees without a full-time staff are serviced by the office of the Secretary-General Manager.

One of the standing committees of the Board of Trustees is the Council on National Defense. This Council is a direct outgrowth of a special committee appointed by the House of Delegates in December 1945 to study the experiences of medical officers during World War II with special reference to opportunities for study, research, actual treatment of the sick, rotation of medical assignments, and use of medical officers for nonmedical duties.

The responsibilities of the Council on National Defense generally fall into two areas—military medical affairs and civil defense matters as they relate to medical preparedness. Because of the increased scope of activities in these two areas within the

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From the Council on National Defense of the American Medical Association. The views and opinions expressed are not necessarily those of the Department of Defense.

—Editor.

past few years, two committees of the Council were established—the Committee on Military Medical Affairs and the Committee on Civil Defense.

The Council assists the Armed Forces, as well as state and federal civil defense authorities, with medical and health problems and acts as a liaison with allied health agencies regarding personnel, facilities, and material needed in time of national emergency. It assists in planning for the distribution of medical and allied personnel in an all-out emergency, aids with national and state disaster relief plans, and co-ordinates the work of the state emergency medical service committees.

In the field of military medical affairs, the Council and its Committee work closely with the Surgeons General of the armed services and the Assistant Secretary of Defense (Health and Medical) in formulating plans and procedures designed to improve medical care for members of the Armed Forces. In this way, they also assist in ensuring the most advantageous use of the country's medical manpower. For several years the Council has conducted a continuing survey among physicians being released from active military service. The survey is designed to obtain information on the utilization of physicians and medical staffing conditions in the Armed Forces and to solicit comments and suggestions concerning the improvement of the military medical corps. Reports, covering a six month's summary, are published in the *Journal of the American Medical Association*, and copies are furnished to military representatives. These reports have served as a guide for discussions with the military departments.

Another activity of the Council and its Committee on Military Medical Affairs is a placement service to furnish assistance to physicians being released from active military service by providing information pertaining to available civilian medical opportunities. This program has been well received and the Council has furnished placement assistance to over 2,000 physicians. The Council also assists State Volunteer Medical Advisory Committees to the Selective Service System in replacing deferred physicians who have a military obligation. The Council also closely follows federal legislative proposals which, if enacted, would affect military medical activities.

The Council attempts to ensure a proper balance between the medical needs of the civilian population and the Armed Forces, by working closely with the National Health Resources Advisory Committee, the National Advisory Committee to the Selective Service System, and state advisory committees to Selective Service.

The Council firmly believes that the development of a strong and attractive medical service of the Armed Forces and federal agencies is in the best interest of the public welfare, and that the development of such services depends on the confidence and intimate collaboration of the medical profession of this nation.

Next month, civil defense activities of the Council on National Defense and other operations of the American Medical Association will be discussed.

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## DEATHS

CUNOV, Harvey Frank, Major, MSC, USAR, San Antonio, Tex.; 3d Army Area Medical Laboratory, Fort McPherson, Ga.; graduated in 1929 from the Michigan State College, East Lansing, Mich.; commissioned a First Lieutenant 17 February 1943; ordered to active duty 4 March 1943; died 23 November 1955, age 51, of myocardial infarction.

DE FOREST, Julia Ann, Lieutenant (jg) (NC) USNR, Douglas, Wyo.; U. S. Naval Station, Kodiak, Alaska; graduated in 1951 from the St. Mary's School of Nursing, Rochester, Minn.; appointed an Ensign 17 March 1953; ordered to active duty 1 May 1953; died 2 December 1955, age 25, in Kodiak, Alaska.

FRANK, Elliot Herman, Major, DC, USAR, Wantagh, Long Island, N. Y.; 2104th Service Unit, Camp A. P. Hill, Va.; graduated in 1941 from the University of Indiana School of Dentistry, Indianapolis, Ind.; commissioned a Major 28 February 1955; ordered to active duty 9 May 1955; died 5 September 1955, age 42, in Fredericksburg, Va., of coronary thrombosis.

FRAZEE, Edward Blackwell, Lieutenant Colonel, MSC, USA, Sioux Falls, S. D.; Landstuhl Army Medical Center, Germany; graduated in 1935 from the Lehigh University College of Chemistry, Bethlehem, Pa.; commissioned a Second Lieutenant 27 September 1941; died 23 October 1955, age 43, in Germany, of injuries received in an automobile accident.

GRANT, Seymour, Captain, MC, USAR, Sepulveda, Calif.; Ryukyus Army Hospital, Okinawa; graduated in 1950 from the University of Michigan Medical School, Ann Arbor, Mich.; commissioned a First Lieutenant and ordered to active duty 25 August 1953; died 24 November 1955, age 31, in Okinawa.

ORMAND, Margaret Louise, Major, ANC, USA, Richmond, Va.; William Beaumont Army Hospital, Fort Bliss, Tex.; graduated in 1934 from the Petersburg Hospital School of Nursing, Petersburg, Va.; commissioned a Second Lieutenant 2 February 1941; died 13 November 1955, age 42, at the Deming Ladies Hospital, Deming, N. Mex., of injuries received in an automobile accident.

# THE MEDICAL OFFICER WRITES

## Articles Published in Other Journals

Adelson, E., Capt., MC, USA; Crosby, W. H., Lt. Col., MC, USA; and Roeder, W. H., Cpl., Army Medical Service: Further studies of hemostatic defect caused by intravenous dextran. *J. Lab. & Clin. Med.* 45: 441-448, Mar. 1955.

Alling, C. C., Maj., DC, USA: Lower lip carcinoma treated with surgery and radiotherapy; case report with comment demonstrating value of suspicious and inquiring attitude toward lesions of unknown etiology. *Oral Surg., Oral Med. & Oral Path.* 8: 591-594, June 1955.

Alling, C. C., Maj., DC, USA: Sialolithiasis; classical case of sialolithiasis that was misdiagnosed. *Oral Surg., Oral Med. & Oral Path.* 8: 595-597, June 1955.

Beat, S. H., Maj., USAF (MC): Emergency tracheal and bronchial conditions. *Illinois M. J.* 107: 236-239, May 1955.

Behrens, C., Reat Adm. (MC) USN: Some notes on atomic medicine. *J. South Carolina M. A.* 51: 155-159, May 1955.

Bell, A. L. L., Capt., USAF (MC), and Howell, T. W., Lt. Col., USAF (MC): Screening tests for pulmonary insufficiency; timed and total vital capacity analysis compared with maximum breathing capacity test. *J. Aviation Med.* 26: 218-229, June 1955.

Betty, L. R., Maj., MC, USA, and Burrows, R. B., Lt. Col., MSC, USA: Appendicitis with cestodes; report of case. *A. M. A. Arch. Path.* 59: 587-593, May 1955.

Caldwell, J. B., Col., DC, USA: Neurological anomaly associated with extreme malposition of mandibular canines. *Oral Surg., Oral Med. & Oral Path.* 8: 484-487, May 1955.

Calloway, D. H.; Grossman, M. I.; Bowman, J., Capt., MC, USA; and Calhoun, W. K.: Effect of previous level of protein feeding on wound healing and on metabolic response to injury. *Surgery* 37: 935-946, June 1955.

Freud, W. I., Lt. (MC) USNR: Diabetes insipidus and pulmonary fibrosis. *A. M. A. Arch. Int. Med.* 95: 823-827, June 1955.

Gerry, R. G., Comdr. (DC) USN, and Williams, S. F., Capt. (MC) USN: Primary reticulum-cell sarcoma of mandible. *Oral Surg., Oral Med. & Oral Path.* 8: 568-581, June 1955.

Hewlett, T. H., Lt. Col., MC, USA: Recurrent tracheo-esophageal fistula. *J. Thoracic Surg.* 29: 658-664, June 1955.

Hollingsworth, J. W., Capt., MC, USA: Lifespan of fetal erythrocytes. *J. Lab. & Clin. Med.* 49: 469-473, Mar. 1955.

Jones, T. C., Lt. Col., VC, USA, and Prine, J. R., Capt., USAF (VC): Systemic mycosis in animals. (Scientific Exhibits) *A. M. A. Arch. Path.* 59: 618-623, May 1955.

Latham, E. F., Lt. (MC) USN; Nesbitt, R. E. L., Jr.; and Anderson G. W.: Clinical pathological study of newborn lung with hyaline-like membrane. *Bull. Johns Hopkins Hosp.* 96: 173-198, May 1955.

McKay, D. G., Capt., MC, USA; Hardaway, R. M., III, Lt. Col., MC, USA; Wahle, G. H., Jr., 1st Lt., MC, USA; and Hall, R. M., Capt., MC, USA: Experimental pseudomembranous enterocolitis; production of means of thrombosis of intestinal mucosal capillaries. *A. M. A. Arch. Int. Med.* 95: 779-787, June 1955.

Palmer, E. D., Lt. Col., MC, USA: Dysphagia lusoria; clinical aspects in adult. *Ann. Int. Med.* 42: 1173-1180, June 1955.

# Promotions of Officers

The following officers of the military medical services on active duty in the Army, Navy, and Air Force have recently received temporary promotions to the rank indicated:

## MEDICAL CORPS

ABELL, Thomas G., Lt., USN  
 AMSDEN, Neal F., Lt., USN  
 ANDERSON, Lewis D., Lt., USN  
 ARBONAFIGUEROA, Joseph A., Lt., USN  
 ASHCROTH, Charles F., Lt., USN  
 BAKER, Larry D., Lt., USN  
 BARRICK, Richard E., Lt., USN  
 BAUER, Clifford T., Lt., USN  
 BECKER, Bruce A., Lt., USN  
 BELL, George R., Lt., USN  
 BENNETT, Wayne E., Lt., USN  
 BEPMAN, Irwin, Lt., USN  
 BUCHER, Emanuel M., Lt., USN  
 BLUM, Harold F., Lt., USN  
 BONNEY, James H., Lt., USN  
 BOWLIN, Paul F., Lt., USN  
 BRANDT, Henry E., Lt., USN  
 BRIDGE, Robert E., Lt., USN  
 BRINK, Paul E., Lt., USN  
 BRODIE, Sheldon J., Lt., USN  
 BROWN, Dudley E., Jr., Lt., USN  
 BROWN, Jacob V., Lt., USN  
 BROWN, Philip W., Jr., Lt., USN  
 BURKE, Albert V., Lt., USN  
 BURKE, Robert A., Lt., USN  
 BURNIS, Boyd L., Lt., USN  
 BUTLER, Milton C., Jr., Lt., USN  
 CANNON, Joseph N., Jr., Lt., USN  
 CARFENTER, Harry M., Lt., USN  
 CARSON, William E., Lt., USN  
 CASEBOLT, Donald E., Lt., USN  
 CAUFFMAN, William J., Lt., USN  
 CICALESE, Gerard T., Lt., USN  
 COLE, Buell C., Lt., USN  
 COLLINS, James E., Lt., USN  
 CORSO, Philip F., Lt., USN  
 CORSON, Hampton P., Lt., USN  
 COX, James L. O., Lt., USN  
 CROCK, Angus M. O., Lt., USN  
 DALRYMPLE, Richard E., Lt., USN  
 DARDIS, Alfred R., Lt., USN  
 DAVIS, Richard G., Lt., USN  
 DEARANI, Abraham C., Lt., USN  
 DOOLEY, Thomas A., III, Lt., USN  
 DRAHEIM, Jerry W., Lt., USN  
 DUDLEY, Hugh R., Lt., USN  
 DULANEY, Charles H., Lt., USN  
 DUNLAP, James A., Jr., Lt., USN  
 DUNT, Thomas S., Jr., Lt., USN  
 EAGAN, John T., Lt., USN  
 EASTERDAY, Robert R., Lt., USN  
 EDWARDS, Ernest G., Lt., USN  
 EFRON, Robert, Lt., USN  
 ELAM, William N., Jr., Lt., USN  
 FABRICIUS, Richard N., Lt., USN  
 FEIGELMAN, Howard F., Lt., USN  
 FITCHETT, Vernon H., Lt., USN  
 FLANAGAN, William L., Lt., USN  
 FLETCHER, William P., Lt., USN  
 FORTENBERRY, Jerry A., Lt., USN  
 FOSTER, Donald J., Lt., USN  
 FREEMAN, William T., Lt., USN  
 FRIEDBERG, Samuel J., Lt., USN  
 FRY, William J., Lt., USN  
 GARRECK, Joseph S., III, Lt., USN  
 GERBER, Edward, Lt., USN  
 GETZEN, Lindsay C., Lt., USN  
 GOLDFISCH, Henry, Lt., USN  
 GOOD, Daniel C., Lt., USN  
 GOODEN, Robert B., Lt., USN  
 GRAFF, Shirley R., Lt., USN  
 GREEN, Leo R., Lt., USN  
 GROTE, Arthur J., Lt., USN  
 GULFES, Thomas A., Jr., Lt., USN  
 GUDERIAN, Arnold M., Lt., USN  
 GUSSACK, Harold A., Lt., USN  
 GUSSLER, Charles G., Lt., USN  
 GUTHRIE, Andrew D., Jr., Lt., USN  
 HALL, Louis A., Lt., USN  
 HALL, William M., Lt., USN  
 HARRIS, James O., Lt., USN  
 HARTMAN, John M., Lt., USN  
 HEATON, Elton, Jr., Lt., USN  
 HEMDESS, Edwin M., Lt., USN  
 HENSOLO, William F., Lt., USN  
 HERRING, William B., Lt., USN  
 HICKS, Jesse R., Lt., USN  
 HINTON, Benjamin F., Lt., USN  
 HOFMANN, Walter D., Lt., USN  
 HOOVER, Robert T., Lt., USN  
 HORNER, Robert L., Lt., USN  
 HURLEY, Lloyd A., Lt., USN  
 ICHNS, Raymond J., Lt., USN  
 JOHNSON, Louis L., Lt., USN  
 JUDGE, Walter F., Lt., USN  
 KELLEHER, Robert E., Lt., USN  
 KEMP, Vernon E., Jr., Lt., USN  
 KEYS, George W., Lt., USN  
 KING, Lawrence M., Jr., Lt., USN  
 KING, Philip J., Lt., USN  
 KINGSOLVER, Wendell R., Lt., USN  
 KLER, Thomas R., Lt., USN  
 LABITZKE, Bertano G., Lt., USN  
 LAVELL, Thomas E., Jr., Lt., USN  
 LEFER, Leon, Lt., USN  
 LEVY, Marshall S., Lt., USN  
 LEWIS, Lawrence J., Lt., USN  
 LIEBENDORFER, Richard A., Lt., USN  
 LIVINGOOD, John K., Lt., USN  
 LOCKE, Francis A., Lt., USN  
 LONG, Henry H., Lt., USN  
 MANUEL, Clayton K., Lt., USN  
 MARTIN, Shirley A., Lt., USN  
 MATTHEW, Daniel R., Lt., USN  
 MAYBERRY, William E., Lt., USN  
 MAYLE, Francis C., Jr., Lt., USN  
 McHENRY, Laurie E., Jr., Lt., USN  
 McLEAN, George E., Lt., USN  
 McMANAN, Robert O., Lt., USN  
 McNEELY, Irwin H., Lt., USN  
 MENDELSON, Ronald E., Lt., USN  
 METCALF, John W., Jr., Lt., USN  
 MISHEN, Mark M., Lt., USN  
 MOERSCH, Richard N., Lt., USN  
 MCYA, Frank, Lt., USN  
 MYERS, James D., Lt., USN  
 NELLERMOE, Carrol W., Lt., USN  
 NELSON, Raymond M., Lt., USN

### MEDICAL CORPS—Continued

NEMEROVSKI, Sheldo A., Lt., USN  
NIRSCHL, Boyd F., Lt., USN  
NOWELL, Peter C., Lt., USN  
NUNNERY, Arthur W., Lt., USN  
O'CONNELL, Fred H., Lt., USN  
OSTLUND, Philip D., Lt., USN  
OTTUM, John A., Lt., USN  
OWSLEY, John Q., Jr., Lt., USN  
PAWLOWSKI, Joseph M., Lt., USN  
PENNISI, Joseph A., Lt., USN  
POMPONIO, Joseph G., Lt., USN  
POSTLE, Jack R., Lt., USN  
QUICKERT, Marvin H., Lt., USN  
RAFFENSPERGER, John G., Lt., USN  
REISER, Albert I., Lt., USN  
RESTOSOTO, Andres D., Lt., USN  
REYNOLDS, Arthur M., Jr., Lt., USN  
RICHARDS, John B., Lt., USN  
RICHARDSON, Joseph H., Lt., USN  
RING, John J., Lt., USN  
RIPPLE, Rudolph J., Jr., Lt., USN  
RITTENBURY, Max S., Lt., USN  
ROBERTS, Arthur R., Lt., USN  
ROSSWAY, Warren H., Lt., USN  
ROYCE, Paul C., Lt., USN  
RUNDLE, Frank L., Lt., USN  
RUSSELL, John M., Jr., Lt., USN  
SACRINTY, Nicholas W., Lt., USN  
SAGER, Stanley M., Lt., USN  
SAVILLE, John W., Lt., USN

SCHOEFFEL, Michael E., Lt., USN  
SEARS, Peter D., Lt., USN  
SHEFFEL, Donald J., Sr., Lt., USN  
SHUTT, John P., Lt., USN  
SIMMONS, Ernest C., Lt., USN  
SINGLETON, Samuel W., Lt., USN  
SLAGER, Richard F., Lt., USN  
SLATER, John B., Lt., USN  
SMITH, Jack G., Lt., USN  
SMITH, James W., Lt., USN  
SOLBERG, Lincoln E., Lt., USN  
STAGGERS, Frank E., Lt., USN  
STEELE, Jack T., Lt., USN  
STELLER, Robert E., Lt., USN  
STEVENSON, Andrew W., Jr., Lt., USN  
STOHLMAN, John W., III, Lt., USN  
STRICKLER, James C., Lt., USN  
TAYLOR, Robert D., Lt., USN  
TEYNOR, Joseph W., Lt., USN  
THOMPSON, Joseph M., Lt., USN  
TOBIN, Arnold D., Lt., USN  
TORSNEY, Jerome M., Lt., USN  
WARE, Robert E., Lt., USN  
WEIS, Donald R., Lt., USN  
WESTPHAL, Benjamin H., Lt., USN  
WHITE, Bradford C., Lt., USN  
WHITE, Jack C., Lt., USN  
WILKIE, Ormond L., Lt., USN  
WILLIS, Harlan L., Lt., USN  
WURZEL, John F., Lt., USN

### DENTAL CORPS

AARONIAN, James B., Lt., USN  
ALLAN, Lamont D., Lt., USN  
ANDERSON, Gordon D., Lt., USN  
ANDREWS, Jack W., Lt., USN  
ANTONIESKI, Eugene P., Lt., USN  
BACON, Stanley H., Lt., USN  
BARBER, Herbert, Lt., USN  
BECKMANN, William J., Lt., USN  
BENTON, Robert H., Lt., USN  
BJERKEN, Maurice R., Lt., USN  
BLAGBROUGH, Richard W., Lt., USN  
BOLINE, Charles A., Lt., USN  
BRADLEY, Daniel M., Jr., Lt., USN  
BROFSKY, Herbert B., Lt., USN  
BROKAW, Rodman, Lt., USN  
BRYAN, William J., Lt., USN  
BUCKLEY, Arthur B., Lt., USN  
BURKHARD, Robert W., Lt., USN  
BURNS, Kurt D., Lt., USN  
CARUSILLO, Louis J., Jr., Lt., USN  
CHAIN, Robert R., Lt., USN  
CHOISER, Frederick G., Lt., USN  
CHRISTENSON, Robert E., Lt., USN  
CHRISTIE, Robert W., Jr., Lt., USN  
CLIPPINGER, Richard V., Lt., USN  
CODY, Donald J., Lt., USN  
CORNISH, Robert L., Lt., USN  
COWEN, Charles E., Jr., Lt., USN  
COX, Robert M., Jr., Lt., USN  
CURLEY, Philip W., Lt., USN  
DAMIANO, Maurice A., Lt., USN  
DAVIS, Thomas G., Lt., USN  
DAY, Lawrence D., Lt., USN  
DEJULIEN, Lorence F., Jr., Lt., USN  
DEUTSCH, Thomas J., Lt., USN  
DEVINE, Robert K., Lt., USN  
DILLARD, Clarence E., Jr., Lt., USN  
DODELSON, Donald J., Lt., USN  
DRAKE, Daniel H., Lt., USN  
DRECHSEL, Lewis W., Lt., USN  
DUCA, Lawrence P., Lt., USN  
DVOROVY, Eugene S., Lt., USN

FIELDS, Ellis S., Lt., USN  
FINK, Herbert A., Lt., USN  
FIOCCHI, Raymond M., Lt., USN  
FLETCHER, Lelland M., Lt., USN  
FOOTE, George B., Col., USA  
FOSTER, Glen E., Jr., Lt., USN  
FREEBURN, Harold E., Jr., Lt., USN  
FREED, Sidney, Lt., USN  
FRITSCHKE, James, Lt., USN  
GABRIEL, Thomas W., Lt., USN  
GARMAN, Thomas A., Lt., USN  
GATES, Richard H., Lt., USN  
GERVASON, Richard E., Lt., USN  
GLASMAN, Milton S., Lt., USN  
GOLAN, Theodore P., Lt., USN  
GOLDSTON, Stanley, Lt., USN  
GORDON, Jerome, Lt., USN  
GOULD, John C., Jr., Lt., USN  
GRAY, Paul L., Lt., USN  
GREGORY, William A., Lt., USN  
GROVER, Alan J., Lt., USN  
HAESLER, George A., Capt., USA  
HARTLAND, Thomas J., Lt., USN  
HARTLEY, Bruce R., Lt., USN  
HAYS, James W., Lt., USN  
HAZEN, Stanley P., Lt., USN  
HEATH, Wayne L., Lt., USN  
HICKEY, David G., Lt., USN  
HILL, Jay W., Lt., USN  
HILLEBRAND, Paul J., Lt., USN  
HOIEN, Ralph D., Lt., USN  
HOLTER, Paul W., Col., USA  
HYDE, Philip L., Lt., USN  
HYLTON, Roscoe P., Jr., Lt., USN  
IRBY, William B., Col., USA  
JACOBSON, Robert L., Lt., USN  
JAFFE, Raymond P., Lt., USN  
JOHNS, Onas L., Col., USA  
JOHNSON, George S., Jr., Lt., USN  
JOHNSON, Thomas E., Lt., USN  
JOVOIS, Alexander J., Lt., USN  
KAEP, Thomas J., Lt., USN



KAPLAN, Herman, Lt., USN  
 KELLOGG, Keith D., Lt., USN  
 KELLY, Joseph M., Lt., USN  
 KELLY, William P., Lt., USN  
 KESSLER, William B., Lt., USN  
 KWATEKY, Frank, Lt., USN  
 KLOEFFELER, Dale D., Lt., USN  
 KWART, Donald, Lt., USN  
 LABRIOLA, William K., Lt., USN  
 LAMTERMAYER, Richard N., Lt., USN  
 LAWTON, Edward A., Lt., USN  
 LEDICHE, Ray N., Lt., USN  
 LEISER, Fred C., Jr., Lt., USN  
 LEWANDOWSKI, Anthony, Lt., USN  
 LIGHT, Richard P., Lt., USN  
 LIEBSTER, Louis F., Lt., USN  
 LINN, Scott D., Col., USA  
 LOMBARDI, Ludwig A., Lt., USN  
 LOVE, William C., Lt., USN  
 MAHER, Ronald E., Lt., USN  
 MATARAZZO, Joseph T., Lt., USN  
 McAULEY, Robert B., Lt., USN  
 McDEVITT, Edwin R., Jr., Lt., USN  
 McDONALD, Richard L., Lt., USN  
 McKEAN, Thomas W., Lt., USN  
 MEKA, Edward M., Lt., USN  
 MERCER, Victor R., Lt., USN  
 MICHELS, Gerald L., Lt., USN  
 MILLER, David L., Lt., USN  
 MINYER, Alex S., Lt., USN  
 MOLL, Robert K., Lt., USN  
 MOORE, Frank B., Lt., USN  
 MOORE, Robert L., Jr., Lt., USN  
 MURRAY, James H., Lt., USN  
 NAGELSEN, Joseph C., Jr., Lt., USN  
 NACOURNEY, Frank E., Lt., USN  
 NASON, Jack R., Lt., USN  
 NEEDLE, Robert N., Lt., USN  
 NELSON, Donald W., Lt., USN  
 NIED, Walter S., Jr., Lt., USN  
 NOLF, Robert S., Lt., USN  
 NORTON, James A., Lt., USN  
 OLSWANG, Kay B., Lt., USN  
 PACE, Madison S., Lt., USN  
 PAINTER, Everett O., Lt., USN  
 PERRODIN, John A., Lt., USN  
 PFEIFER, John S., Lt., USN  
 PENTER, James E., Lt., USN  
 POST, Roger A., Lt., USN  
 POWELL, Karshaw E., Lt., USN  
 FRAHL, Jerome H., Lt., USN  
 RASHKIND, Herbert E., Lt., USN  
 RASOR, Richard D., Lt., USN  
 RATCLIFFE, James R., Lt., USN  
 REESE, James W., Lt., USN  
 REGAN, Frank G., Jr., Lt., USN  
 REIDER, Robert D., Lt., USN  
 RIGGS, Lawrence B., Jr., Lt., USN  
 RICHZICK, James P., Lt., USN  
 ROUGEUX, Lawrence J., Lt., USN  
 ROY, Hector H., Lt., USN  
 S\*WUSCH, Raymond H., Lt., USN  
 SAWYER, Charles K., Lt., USN  
 SCHNEIDER, Leon E., Lt., USN  
 SCHROEMAKER, Darwin D., Lt., USN  
 SCHPOEDER, Ralph C., Lt., USN  
 SEAMON, Dick C., Lt., USN  
 SEGAL, Jerome S., Lt., USN  
 SEPE, George J., Lt., USN  
 SHEFFLER, Edgar A., Lt., USN  
 SHEPARD, Leon A., Lt., USN  
 SHREVE, William B., Jr., Lt., USN  
 SMITH, William B., Col., USA  
 SIMPSON, Keith B., Lt., USN  
 SING, William P., Lt., USN  
 SMITH, Donald C., Lt., USN  
 SMITH, George E., Jr., Lt., USN  
 SMITH, James O., Lt., USN  
 SMITH, John P., Lt., USN  
 SORCKIN, Raymond L., Lt., USN  
 STAROSTA, Norman M., Lt., USN  
 STETZEL, Robert M., Lt., USN  
 STIER, Joseph B., Lt., USN  
 STOLTZ, David R., Lt., USN  
 STORY, Gordon E., Lt., USN  
 STREET, Thomas O., Lt., USN  
 STADLER, Leonard, Lt., USN  
 TANNER, Thomas P., Lt., USN  
 TAYLOR, Albert J., Lt., USN  
 TAYLOR, William N., Lt., USN  
 TERTEL, Kenneth J., Lt., USN  
 TESCH, Robert, Lt., USN  
 THOMPSON, James C., Lt., USN  
 THOMPSON, Robert G., Lt., USN  
 TOW, Herman D., Jr., Lt., USN  
 TRENT, Calvert E., Lt., USN  
 VONNEG, Donald R., Lt., USN  
 WALSH, Robert L., Col., USA  
 WEES, Arnold, Lt., USN  
 WERNER, Robert A., Lt., USN  
 WESTCOTT, Maurice E., Lt., USN  
 WEE, Harry W., Jr., Lt., USN  
 WOLF, Marvin, Lt., USN  
 WOODY, Wilton G., Lt., USN  
 WRIGHT, Francis B., Lt., USN  
 WUTHRICH, Frederick J., Lt., USN  
 YONALLY, James F., Lt., USN  
 ZAKROTSKY, Raymond, Lt., USN  
 ZEMER, Donald N., Lt., USN  
 ZUBER, Walter B., Jr., Lt., USN  
 ZWEIFLER, Leonard J., Lt., USN

MEDICAL SERVICE CORPS

ADAMS, Dwight J., Lt., USN  
 BARKLEY, Lucien E., Lt., USN  
 BERGQUEST, Melvin D., Jr., Lt., USN  
 BIGGS, Leland M., Lt., USN  
 BOBEK, Francis R., Lt., USN  
 BOGGS, Clifford W., Lt., USN  
 BOYE, Warren G., Lt., USN  
 BROWN, Albert E., Lt., USN  
 BRYANT, Harvey P., Lt., USN  
 CARR, Charles A., Jr., Lt., USN  
 CONRAD, Ray W., Lt., USN  
 COURTNEY, John C., Lt., USN  
 DEMPEWOLF, Eugene E., Lt., USN  
 DENNIGHAM, John S., Lt., USN  
 DEVINS, Thomas A., Lt., USN  
 DEWITT, Richard G., Lt., USN  
 DENWIDDE, Carl F., Lt., USN  
 DOUGLAS, George P., Lt., USN  
 DUFFEY, William S., Lt., USN  
 GAY, Lawrence W., Lt., USN  
 GERING, Jack E., Lt., USN  
 GIBBONS, Harry C., Jr., Lt., USN  
 HANAVAN, Robert J., Lt., USN  
 HARVEY, Dallas C., Lt., USN  
 JONES, William H., Lt., USN  
 KELLY, Daniel L., Lt., USN  
 KRAZER, Ernest S., Lt., USN  
 LACY, Dexter J., Lt., USN  
 LAEDTKE, Ralph H., Lt., USN  
 LEACH, Thomas G., Jr., Lt., USN  
 LEE, Raymond W., Lt., USN  
 LIND, Vincent E., Lt., USN

# MEDICAL SERVICE CORPS—Continued

MARSH, William G., Jr., Lt., USN  
 McDONOUGH, William A., Lt., USN  
 McILRAITH, James D., Lt., USN  
 McMAHON, Talmadge G., Lt., USN  
 MERRELL, Walter C., Lt., USN  
 MILLER, Edwin B., Lt., USN  
 MORGAN, William J., Jr., Lt., USN  
 MURPHREE, Henry B., Jr., Lt., USN  
 NEWTON, Richard R., Lt., USN  
 NICHOLSON, Earl M., Lt., USN  
 NYGREN, Raymond A., Lt., USN  
 PFAU, Bernard J., Lt., USN

REVER, Rodney R., Lt., USN  
 SANDEEN, Garnet G., Lt., USN  
 SANDERS, James M., Lt., USN  
 SCALES, Thomas N., Jr., Lt., USN  
 SCHWAB, Albert J., Lt., USN  
 STALLBORIES, Donald G., Lt., USN  
 STILES, Thomas R., Lt., USN  
 SWINDAL, James R., Lt., USN  
 SYKES, Stanley E., Lt., USN  
 WARNER, Albert D., Lt., USN  
 ZALLER, Frank A., Lt., USN

## NURSE CORPS

ANDERSON, June L., Lt., USN  
 BALL, Adele M., Maj., USAF  
 BEAUREGARD, Marie J., 1st Lt., USAF  
 BENSON, Glenda M., 1st Lt., USAF  
 BEVANS, Joan M., 1st Lt., USAF  
 BLACK, Helen J., Lt., USN  
 BOWER, Joan E., Lt., USN  
 BUCKO, Margaret R., Maj., USAF  
 BROWN, Flora B., 1st Lt., USA  
 CANTRELL, Joyce A., 1st Lt., USAF  
 CARPENTER, Lois T., Lt., USN  
 COOPER, Jacqueline L., Capt., USA  
 COOPER, Opal J., Lt., USN  
 CRAIG, Florence V., Lt., USN  
 CROOKER, Shirley K., 1st Lt., USA  
 CROWE, Patricia P., Lt., USN  
 DENNIS, Catherine E., Lt., USN  
 DIAL, Thelma P., Lt., USN  
 DITTMAR, Louise E., Maj., USAF  
 DuPONT, Aileen A., Maj., USA  
 EAKER, Rita J., 1st Lt., USA  
 EASTER, Mary R., Lt., USN  
 EBERHARDT, Marie, Lt., USN  
 ELDRIDGE, Ruth E., Lt., USN  
 ELEBY, Nettie B., 1st Lt., USAF  
 ELLIOTT, Laura S., Lt., USN  
 GREENE, Ina M., Maj., USAF  
 HARRIGAN, Nancy L., Lt., USN  
 HARRISON, Karalyn J., Maj., USA  
 HEARNS, Dorothy M. S., 1st Lt., USAF  
 HEDRICK, Betty S., Lt., USN  
 HENKEL, Dolores A., Lt., USN  
 HENNERSEY, Helen M., Maj., USAF  
 HILBUS, Emily E., Maj., USA  
 HODLEY, Mary E., Maj., USAF  
 HOTZINGER, Marion H., 1st Lt., USAF  
 JAEGER, Elizabeth L., Lt., USN  
 JOHNSON, Katrina O., 1st Lt., USA  
 JONES, Rita K., 1st Lt., USAF  
 KAILAND, Addie E., Lt., USN  
 LEUTZ, Lillian D., Lt., USN  
 LEVIN, Mildred R., Lt., USN  
 LEWIS, Margaret R., Lt., USN  
 MACIEJEWSKI, Marilyn A., 1st Lt., USAF  
 MADDEN, Winifred P., Lt. Col., USAF  
 MAGUIRE, Frances P., Lt., USN  
 MANN, Frankie L., 1st Lt., USA  
 MARCO, Helen, Lt., USN  
 MARSCH, Doris E., Lt., USN  
 MARTIN, Rosalie S., Lt., USN  
 MATTESON, Ethel L., Capt., USAF  
 McCOLLUM, Ernestine L., 1st Lt., USAF  
 MERRICK, Millicent E., Lt., USN  
 MICHAEL, Thedia A., Lt., USN  
 MOFFITT, Jeanne T., Lt., USN  
 MOODY, Anna E., Lt., USN  
 MOULTON, Gloria J., 1st Lt., USA  
 MUHLENFELD, Loret T., Lt., USN  
 NERESON, Myrtle N., Maj., USAF  
 ODOM, Thelma, Lt., USN  
 PAGE, Mida M., 1st Lt., USA

PARENT, Pauline M., 1st Lt., USAF  
 PHILLIPS, Mary J., 1st Lt., USAF  
 PICKETT, Natalie A., Capt., USAF  
 PIERCE, Miriam R., Maj., USAF  
 PINTA, Florence F., 1st Lt., USAF  
 POMMIER, Angelina T., Lt., USN  
 PRICE, Margaret M., Maj., USAF  
 QUINN, Constance A., 1st Lt., USAF  
 RAGLAND, Wilda R., Lt., USN  
 READ, Anna C., Lt., USN  
 REESE, Mary D., Lt., USN  
 RILEY, Jacquelyn M., 1st Lt., USAF  
 ROBERTS, Lucile M., 1st Lt., USA  
 SARGENT, Nell E., Capt., USA  
 SCANLON, Mary M., Capt., USAF  
 SCHELCHER, Laurabel, 1st Lt., USAF  
 SCHIRER, Margaret L., Capt., USA  
 SCHLACHTER, Wilma R., Lt., USN  
 SCHUBERT, Phyllis V., Capt., USA  
 SCOTT, Berniece, Capt., USAF  
 SCUIGGS, Sylvia A. K., 1st Lt., USAF  
 SEVERSON, Shirley R., Lt., USN  
 SGANGA, Anna, Lt., USN  
 SHAFER, Mary H., Lt., USN  
 SHELTON, Wannie L., Lt., USN  
 SHERIDAN, Anne M., Lt., USN  
 SHERIDAN, Edythe C., Capt., USA  
 SHOR, Edith E., Capt., USA  
 SIDELL, Norma A., Capt., USA  
 SMITH, Donna J., Lt., USN  
 SNYDER, Mildred I., Lt., USN  
 SPROWLES, Elizabeth F., Lt., USN  
 STALLARD, Sally M., Capt., USA  
 STEPHENS, Lottie L., Capt., USA  
 STILWELL, Adelaide, Lt., USN  
 STOFFA, Dorothy I., Capt., USA  
 STOLMACK, Rose K., Capt., USA  
 STRUBLE, Mary R., Lt., USN  
 SWANSON, Alice C., Capt., USA  
 TAYLOR, Virginia M., Capt., USA  
 THOMPSON, Carol E., Capt., USA  
 TORRANCE, Marion L., Capt., USA  
 TREGEE, Ruth E., Maj., USAF  
 TURNER, Clementine, Capt., USA  
 TURZINSKI, Dorothy C., Capt., USA  
 ULRICH, Marian J., Lt., USN  
 VALKENAC, Ethel H., Capt., USA  
 VARNER, Marjorie L., Capt., USA  
 VOORHEES, Leah B., Capt., USA  
 WHEELER, Mary B., Lt., USN  
 WHITFIELD, Gilda G., Lt., USN  
 WHITFIELD, Gloria M., Lt., USN  
 WILLIAMS, Alice K., Lt., USN  
 WILLIAMS, Evelyn T., 1st Lt., USAF  
 WILSON, Lorna M., Capt., USA  
 WILSON, Ruth A., Capt., USA  
 WINTER, Eleanor H., Capt., USA  
 WOODING, Sue W., Capt., USA  
 WROTNOWSKI, Wanda E., Capt., USA  
 YARNALL, Ada M., Lt., USN  
 YOUNG, Nora D., 1st Lt., USAF

## Reviews of Recent Books

**HEART DISEASE, Its Diagnosis and Treatment**, by *Emanuel Goldberger, M. D., F. A. C. P.* 2d edition. 781 pages; 298 illustrations on 107 figures; 5 tables. Lea & Febiger, Philadelphia, Pa., 1955. Price \$12.50.

It is the intent of the author to present a complete, concise, and thoroughly up-to-date textbook of clinical cardiology. In this aim he succeeds admirably. By enlarging the first edition about 25 percent, numerous recent topics of clinical interest are included which are not elsewhere available in comparable textbook form.

Established concepts are simply presented with emphasis on clinical practicability as opposed to historical development. Similarly, recent trends are presented in condensed form which, albeit opinionated, are generally conservative while being fair. Included are sections on ballistocardiography, diagnostic technics applicable in the evaluation of lesions amenable to heart surgery, newer drugs, et cetera.

Other features of merit are: A bibliography mainly applying to work done in the last 5 to 10 years; unusually complete and accurate index and table of contents; mainly diagrammatic (as opposed to photographic) illustrations; clear and direct style; and excellent format. The biggest drawback is the number of one-sided opinions authoritatively presented.

This volume will be most appreciated by physicians in diverse fields, who are interested in a thoroughly modern text of cardiology of unusually wide coverage, yet relatively brief in form.

—R. B. BICKERSON, LL. Col., MC, USA

**PRACTICAL NEUROLOGY**, by *Leo M. Davidoff, M. D.* and *Emanuel H. Feiring, M. D.* 442 pages. Landsberger Medical Books, Inc. Distributed solely by the Blakiston Division of the McGraw-Hill Book Co., Inc., New York, N. Y., 1955. Price \$7.

This is the latest in a series of handbooks for the general practitioner. It includes a wide survey of neurologic methods, diagnosis, therapy, and results, presented in a clear, concise manner. The amazing completeness as to essentials, in so small a text, is a tribute to the authors. Should some wonder at the ability of one of America's leading neurosurgical teams to produce a basic general neurologic text of this nature, one has only to note their diagnostic criteria and therapeutic principles to realize their penetrating grasp of the material, which varies from tumors of the nervous system through inflammatory and degenerating processes.

It is recommended, not only to the general physician, but to all interested in a ready reference on fundamental elements of neurologic disease.—JAMES F. HAMMILL, LL. Col., MC, USA

BLOOD SUPPLY AND ANATOMY OF THE UPPER ABDOMINAL ORGANS, With a Descriptive Atlas, by *Nicholas A. Michels, M. A., D. Sc. (Louvain)*. 581 pages; 172 illustrations, including 166 in color. J. B. Lippincott Co., Philadelphia, Pa., 1955. Price \$24.

This anatomy book is written for study and use by surgeons, but is so complete and detailed in its descriptions and illustrations that I am sure it will be consulted by anatomists as well. The anatomy of the upper abdominal organs is a subject in which every surgeon should be well versed, and this volume presents it so well and completely that it should be required reading and study for every surgeon, and particularly for every young resident surgeon.

The anatomic descriptions of the organs and their blood supply are complete in nearly all details. The charts and illustrations show clearly the detailed anatomy of the areas, and present, as shown in no other available text, the innumerable variations in anatomy which the surgeon may encounter in upper abdominal operations.

The surgical literature today is replete with reports of catastrophes precipitated by surgeons operating in the upper abdomen. If the detailed anatomy in this book were common knowledge to all surgeons, many of those accidents and their unfortunate results could surely be avoided.

—FELIX P. BALLENGER, *Comdr. (MC) USN*

THE HEMORRHAGIC DISORDERS, A Clinical and Therapeutic Approach, by *Mario Stefanini, M. D. and William Dameshek, M. D.* 368 pages; illustrated. Grune & Stratton, Inc., New York, N. Y., 1955. Price \$11.75.

This is an authoritative, amply illustrated, clearly written volume on the clinical and laboratory diagnosis and treatment of the hemorrhagic disorders. In contrast to most other current texts on this subject, it gives proper emphasis to other hemostatic defects in addition to those of the coagulation mechanism, namely, defects in the vascular, platelet, and fibrinolytic mechanisms.

The authors have made this book thoroughly up to date by giving due consideration to the "newer" entities of "dysproteinemic," vascular, and fibrinolytic purpuras as well as hemorrhagic disturbances of pregnancy and the puerperium. They have even furnished an addendum of significant findings reported in the literature in early 1955.

Of especial practical value to the practicing physician are the many time-saving and space-saving diagnostic tables, including "screening tests" and therapeutic tables, as well as detailed directions on therapy. Stimulating to the investigator in this and related fields will be the several theories suggested for the cause or pathogenesis of various hemorrhagic disorders.

The authors have admirably achieved their objective of writing a practical, well-balanced book on this important subject. At the same time, they have accomplished this in a scholarly manner.

—H. LEONARD JONES, *Comdr. (MC) USN*

TABLE 1. *Vehicle fatalities by type of accident in U. S. Navy and Marine Corps personnel, 1952 through 1954*

Type of vehicle	Driver or passenger	Vehicle not in accident. Man fell off	Vehicle in accident				Location		
			No rollover		Rollover		U. S.	Korea	Overseas
			Stayed in	Thrown out	Pinned down	Thrown out			
<b>OPEN TOP</b>									
Jeep	Driver			2	5 <sup>b</sup>	4 <sup>a</sup>	2	3	4
	Passenger		1		1	3	2		3
Wespos carrier	Passenger			2	4	1	1	4	2
Heavy 6 by 6 truck	Driver				8		3	4	1
	Passenger	3			6 <sup>c</sup>		1	6	2
DUKW (duck)	Passenger				1			1	
Caterpillar	Driver	3					1		2
<b>HARD TOP</b>									
Fire or crash truck	Driver	6			1 <sup>e</sup>	2	2	1	2
	Passenger	1					4		
Gasoline truck	Passenger						1		
Ambulance	Driver		1	3		2 <sup>d</sup>	1		1
Pickup truck	Driver		1	1			1		
	Pass. (front)		1 <sup>e</sup>				1		
	Pass. (rear)			2 <sup>d</sup>			1	1	
Carryall or panel truck	Driver		1 <sup>e</sup>			2 <sup>d</sup>	2		
	Passenger		1				3		
Dump truck	Driver	1					2		
	Passenger								
Total		14	7	10	26	15	32	22	18

TABLE 1. *Vehicular fatalities by type of accident in U. S. Navy and Marine Corps personnel in U. S. Government vehicles only (1952 through 1954)*—Continued

- a. In one fatal accident, a passenger was thrown out and escaped with apinal injuries.
- b. Jeep, rolled over, killing passenger; driver was thrown out and escaped injury.
- c. In one fatal accident, eight other passengers in back escaped injury.
- d. In one fatal accident of each type, others in vehicle who were not thrown out were only slightly injured.
- e. Drowned when vehicle ran off pier or turned over in shallow water.

Two vehicular deaths not tabulated occurred on aircraft carriers at sea. In each of these, an aircraft towing truck fell into an elevator well, the driver falling first and the truck on top of him. They are not included in the tabulation, as speed and design of this vehicle would not seem to call for use of seat belts.

those same 33 persons would have been killed had they been kept in the vehicle by seat belts, although in a number of instances they actually were thrown out before being pinned down or rolled on.

On the other hand, in 13 of the 20 deaths in accidents of panel and pickup trucks, carryalls, and other hard-top vehicles, the chances that a seat belt would have prevented the fatality appear to have been very good. In 12 cases the victim was thrown out of the cab or enclosed part of the vehicle; however, in one of these he was probably too drunk to have used a belt, leaving 11 who might have been saved. In four of the accidents the victim was fatally injured while remaining in the cab; however, in one case he was crushed by the steering wheel and in another he probably was too drunk to have used a belt, leaving 2 more who might have been saved. In three deaths the victim was drowned when the vehicle turned over into a rice paddy or plunged off a pier; and the remaining man killed was sitting on the rear of a pickup truck and was thrown out.

In the one ambulance accident involving a fatality, not only was the driver killed but also the passenger (a medical officer) was thrown about and critically injured. Considering that in 1950 another medical officer was killed in a Navy ambulance collision by being thrown from the right front seat, it would seem especially important to provide safety belt protection for the passenger on the front seat of a standard ambulance.

There were 14 deaths caused by falls from vehicles not involved in accidents. Seven of the victims were killed by falling from fire, crash, or gasoline trucks; usually when the truck was making a sharp turn. Two of these were passengers seated in the cab, and five were men standing on the truck, who lost their grip on a turn or while changing position. The two seated passengers certainly would have been saved by seat belts. It also would appear warranted to consider the use of quick-release belts to hold standees in place on certain types of fire and crash vehicles. Four of the 14 victims fell off the rear end or side rail of 6 by 6

TABLE 1. Vehicular fatalities by type of accident in U. S. Navy and Marine Corps personnel (1952 through 1954)

Type of vehicle	Driver or passenger	Vehicle not in accident. Men fell off	Vehicle involved				Rollover	Location		
			No rollover		Planned down			U. S.	Korea	Other
			Stayed in	Thrown out	Thrown out					
OPEN TOP										
Jeep	Driver		1	2	3 <sup>b</sup>	4 <sup>a</sup>	2	5	4	
	Passenger				1	3	2		3	
Weapons carrier	Passenger			2	4	1	1	4	2	
Heavy 6 by 6 truck	Driver				8		3	4	1	
	Passenger	3			6 <sup>c</sup>		1	6	2	
DUKW (duck)	Passenger				1			1		
Caterpillar	Driver	3					1		2	
HARD TOP										
Fire or crash truck	Driver	6			1 <sup>c</sup>	2	2	1	2	
	Passenger						4			
Gasoline truck	Passenger	1					1			
Ambulance	Driver		1	3		2 <sup>d</sup>	1		1	
Pickup truck	Driver		1 <sup>e</sup>	1			5			
	Pass. (front)						1			
	Pass. (rear)						1	1		
Carryall or panel truck	Driver		1 <sup>e</sup>	2 <sup>d</sup>		2 <sup>d</sup>	2			
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trucks or dump trucks, and three died from falling between the frame and treads of caterpillars.

If seat belts had been installed in hard-top vehicles only, and if men had been successfully indoctrinated in using them (which will take considerable time and effort and never be fully achieved), a saving of 15 lives is the maximum benefit that could have been expected on mortality alone. If all these deaths had been prevented, the monetary saving would have amounted to over \$470,000. This is only the beginning of savings possible, as many grave and costly injuries would at the same time have been prevented or converted to minor ones.

The lack of adequate data in many reports of death is a serious handicap in estimating the value of preventive measures, either potential or realized. Even more sketchy is the data on injuries which are survived. The latter are far more frequent and often much more costly in time, medical manpower, and money, than deaths. Data of immense value for planning and for subsequent evaluation could be obtained if more detailed information were required on all automobile injuries involving more than a few sick days. A minimum of 5 or 10 days might be specified so as to keep the burden of reporting within reason. The causative vehicle, the method in which injury was sustained, the presence or applicability of safety devices, all need a statistical evaluation.

### SUMMARY

Deaths of Navy and Marine Corps personnel in government-owned ground vehicles are analyzed for a three-year period. More than half of these (41 out of 72) occurred in open-top military type vehicles, a higher proportion than would be expected during peacetime. Provision of seat belts in open-top vehicles would probably not have reduced but would more likely have increased these fatalities. In only five deaths did this type of vehicle remain upright when involved in an accident, whereas in 33 it rolled over. By comparison, 10 persons who escaped death in rollover accidents by being thrown out would probably have been killed if they had been kept in by seat belts.

In hard-top vehicles involved in accidents, 15 of 20 deaths would probably have been prevented if the victim had been wearing a seat belt, although in two cases he was too drunk to have used one. In 12 of the deaths, the victim was thrown from the cab, with or without rollover. Front seat passengers in ambulances appear to be especially at risk when not provided with seat belts.

Seven deaths, or one out of 10, occurred in falls from fire and crash trucks when the vehicle was merely making a turn. In two of these, the man slid off a seat. In these two cases, seat belts

would certainly have prevented the accidents had they been worn. Quick-release bolts for standees should also be considered for this type of vehicle.

If seat belts are used in hard-top vehicles, potential monetary savings on deaths alone amount to \$470,000 in three years. In addition, many serious and costly injuries would be prevented.

Weighing the cost of preventive measures against their savings, both in deaths and in the far more frequent nonfatal but costly injuries, requires more detailed reporting of the causes of trauma in serious and fatal vehicular accidents.

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#### THE NAVY — 1957

"The Navy will add six warships and five other vessels to the fleet during fiscal '57, but manpower will be decreased.

"Slated to end fiscal '56 on 30 June with 405 warships, the Navy has won Administration approval for 411 warships a year later and for 594 other ships—a total of 1105, compared with 944 planned for the end of the present fiscal year.

"The Navy will have the same number of carrier air groups, 17, and carrier anti-submarine squadrons, 31, at the start and end of fiscal '57.

"On the personnel side, newly announced plans will show the Navy beginning the year of 1 July with 662,744 officers and men, and ending the 12 month-period with 662,175.

"At the end of fiscal '57, the Navy foresees a strength level of 72,800 officers and 584,200 enlisted men, identical figures with those at the beginning of the year."

—HAROLD HELFER,  
in *Our Navy*, p. 16, Mar. 1956

## MINOR REFRACTIVE ERRORS VERSUS DEPTH PERCEPTION

BUTHER L. NEWMAN, *Lieutenant (junior grade), MSC, USN*

GOOD DEPTH perception is important to everyone, but as was pointed out when the visual screening profiles of a group of Overhaul and Repair Department inspectors at this air station were being reviewed, some who are in technical trades and professions need to excel in this particular visual skill. Because screening on depth perception was included in the routine checks along with far and near point acuity, far and near point muscle balance, and color perception, some interesting data were compiled. This is especially true of the findings on 17 men who initially failed the depth perception screening, but who passed on a second trial, after having been refracted and given a lens prescription (table 1). These data substantiate the opinion that refractive error and bad depth perception go hand in hand.

In the phenomenon of depth perception, many factors are combined before a final estimation of depth is accomplished. Although the time element involved in making an estimation is only a split second, a combined reaction to various stimuli has taken place in the observer's nervous system. For purposes of discussion, these stimuli can be called factors, and the factors classified as adjunctive (depending on the relative comparison of one outside object to another) and basic (depending solely on the observer's perception apparatus and the object under estimation). Adjunctive factors are: comparison of retinal image sizes of two familiar objects; motion parallax (*i. e.*, the apparent motion of objects within the visual field surrounding the object of fixation that is caused by movement on the part of the observer); linear perspective; and familiarity with the effects of atmospheric conditions on the appearance of distant objects. This last factor might be referred to as aerial image. Add to this the factor of accommodation (or range of focusing), and you have a fairly complete list of adjunctive factors affecting depth perception that are available to either one- or two-eyed individuals.

Since the best depth perception depends on factors which are available only to persons with binocular vision, and since this

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From U. S. Naval Air Station, San Diego, Calif. Lt. Newman is now assigned to U. S. Naval Hospital, Navy 3923, FPO, San Francisco, Calif.

TABLE 1. Depth scores in 17 subjects before and after application of lens prescriptions

Case number	Age	Unaided visual acuity		Initial depth score*	Lens prescription			Rescreening depth score
					Sphere	Cylinder	Axis	
		Right	Left					
1	33	20/20	20/20 <sup>-1</sup>	0	R -0.25 L -0.50	+0.50 +0.75	180 180	8
2	34	20/20 <sup>-1</sup>	20/20	2	R -0.25 L -0.50	+0.75 +0.50	90 90	7
3	42	20/20	20/40	2	R -0.50 L -1.00	+0.50 +1.00	180 180	6
4	31	20/20	20/20	1	R -0.50 L Plano	+0.50 —	55 —	7
5	48	20/20	20/20	1	R +0.25 L +0.25	— —	— —	4
6	38	20/20	20/20	0	R +0.25 L Plano	— +0.50	— 180	4
7	35	20/20	20/20 <sup>-1</sup>	0	R Plano L -0.75	— +0.50	— 180	4
8	40	20/20	20/20	0	R -0.50 L -0.25	+0.50 +0.75	180 180	5
9	46	20/20	20/20	1	R +0.50 L +0.50	— —	— —	7

TABLE 1. Depth scores in 17 subjects before and after application of lens prescriptions—continued

Case number	Age	Unaided visual acuity		Initial depth score <sup>a</sup>	Lens prescription			Recrossing depth score
		Right	Left		Sphere	Cylinder	Axis	
10	44	20/20	20/20	2	R Plano L Plano	+0.75 +0.75	95 85	6
11	37	20/20	20/20	2	R Plano L Plano	— +0.50	— 90	6
12	42	20/20	20/20 <sup>-1</sup>	1	R +0.25 L +0.75	— —	— —	5
13	31	20/20	20/20	0	R +1.00 L +1.00	— —	— —	5
14	37	20/20	20/20	1	R Plano L Plano	+0.50 +0.25	180 180	5
15	29	20/20	20/20	0	R Plano L Plano	+0.50 +0.50	180 180	6
16	37	20/20 <sup>-1</sup>	20/20 <sup>-1</sup>	0	R -0.50 L -0.50	+0.75 +0.75	55 125	6
17	41	20/20 <sup>-1</sup>	20/20	0	R +0.50 L Plano	— —	— —	5

<sup>a</sup>Depth scores based on the Bausch & Lomb Optical Company system as applied to their ortho-rater screening instrument.

Maximum score possible: 9

Minimum passing scores: 4

article is wholly concerned with binocular subjects, let us consider what takes place in the case of such an observer who is hampered in estimating depth by some slight anomaly in the form of a minor refractive error in one or both eyes. The foremost factor in making a depth estimate that is affected by a refractive error is binocular parallax, by means of which the two eyes working in a binocular pattern can discern the movement of an object either toward or away from the object of fixation. This is possible because binocular subjects have available to their perception apparatus overlapping retinal fields, semidecussation of optic nerve fibers, corresponding points, and conjugate movements of the eyes. Unless visual acuity is approximately equal in the two eyes, the foregoing physiologic factors will not be nearly so effective in helping to make accurate depth estimates. Just what physiochemical, neurophysiologic, or gross anatomic changes are responsible for the phenomena that refractionists call refractive errors is still open for research, but since this article is reporting only the effects of refractive errors on depth perception, I will not attempt further discussion of the physiologic processes involved.

Of about 400 inspectors examined, 17 men ranging from 29 to 48 years of age were found to have substandard depth perception; yet their failing of the depth test on routine visual screening was the first intimation that anything was amiss in their visual apparatus. None would admit to having any subjective complaint with respect to visual acuity or visual discomfort. The fact that these 17 men would be able to pass every other screening test, so long as depth perception was not checked, points up the extreme desirability of including such a test in the routine visual screening of any age or occupational group. Were it not for their having failed on the depth check, these men would not have attained the increased visual efficiency which their subsequent lens prescription afforded them.

These 17 men were not the only ones whose scores on depth screening were below the standard set for Overhaul and Repair inspectors, but they were the only ones of these who had no objective or subjective sign of any visual defect other than faulty depth perception. That the percentage of the entire group examined who failed their depth screening was low was because even prior to the inclusion of the depth check in the screening routine, the men were periodically rescreened every six months, and appropriate changes were made in their lens prescriptions. Therefore, each could be considered to be at his peak efficiency insofar as visual acuity was concerned.

All but one of the 17 men had unaided monocular visual acuity of 20/20, the single exception having 20/20 O. D. and 20/40 O. S. There seemed to be no relationship among the 17 in regard to

TABLE 1. Depth scores in 17 subjects before and after application of lens prescriptions—Continued

Case number	Age	Unaided visual acuity		Initial depth score*	Lens prescription			Rescreening depth score
		Right	Left		Sphere	Cylinder	Axis	
10	44	20/20	20/20	2	R Plano L Plano	+0.75 +0.75	95 85	6
11	37	20/20	20/20	2	R Plano L Plano	— +0.50	— 90	6
12	42	20/20	20/20 <sup>-1</sup>	1	R +0.25 L +0.75	— —	— —	5
13	31	20/20	20/20	0	R +1.00 L +1.00	— —	— —	5
14	37	20/20	20/20	1	R Plano L Plano	+0.50 +0.25	180 180	5
15	29	20/20	20/20	0	R Plano L Plano	+0.50 +0.50	180 180	6
16	37	20/20 <sup>-1</sup>	20/20 <sup>-1</sup>	0	R -0.50 L -0.50	+0.75 +0.75	55 125	6
17	41	20/20 <sup>-1</sup>	20/20	0	R +0.50 L Plano	— —	— —	5

\*Depth scores based on the Dauch & Lomb Optical Company system as applied to their ortho-rater screening instrument.

Maximum score possible: 9

Minimum passing score: 4

article is wholly concerned with binocular subjects, let us consider what takes place in the case of such an observer who is hampered in estimating depth by some slight anomaly in the form of a minor refractive error in one or both eyes. The foremost factor in making a depth estimate that is affected by a refractive error is binocular parallax, by means of which the two eyes working in a binocular pattern can discern the movement of an object either toward or away from the object of fixation. This is possible because binocular subjects have available to their perception apparatus overlapping retinal fields, semidecussation of optic nerve fibers, corresponding points, and conjugate movements of the eyes. Unless visual acuity is approximately equal in the two eyes, the foregoing physiologic factors will not be nearly so effective in helping to make accurate depth estimates. Just what physiochemical, neurophysiologic, or gross anatomic changes are responsible for the phenomenon that refractionists call refractive errors is still open for research, but since this article is reporting only the effects of refractive errors on depth perception, I will not attempt further discussion of the physiologic processes involved.

Of about 400 inspectors examined, 17 men ranging from 29 to 48 years of age were found to have substandard depth perception; yet their failing of the depth test on routine visual screening was the first intimation that anything was amiss in their visual apparatus. None would admit to having any subjective complaint with respect to visual acuity or visual discomfort. The fact that these 17 men would be able to pass every other screening test, so long as depth perception was not checked, points up the extreme desirability of including such a test in the routine visual screening of any age or occupational group. Were it not for their having failed on the depth check, these men would not have attained the increased visual efficiency which their subsequent lens prescription afforded them.

These 17 men were not the only ones whose scores on depth screening were below the standard set for Overhaul and Repair inspectors, but they were the only ones of these who had no objective or subjective sign of any visual defect other than faulty depth perception. That the percentage of the entire group examined who failed their depth screening was low was because even prior to the inclusion of the depth check in the screening routine, the men were periodically rescreened every six months, and appropriate changes were made in their lens prescriptions. Therefore, each could be considered to be at his peak efficiency insofar as visual acuity was concerned.

All but one of the 17 men had unaided monocular visual acuity of 20/20, the single exception having 20/20 O.D. and 20/40 O.S. There seemed to be no relationship among the 17 in regard to



the type of refractive correction needed, except that none were myopic. Some had simple hyperopia; others had variable types of astigmatism. One of the group required a short period of supervised orthoptics, in addition to his lens correction, to remedy a moderate amount of excessive exophoria. Upon rescreening after this treatment, he was able to pass the depth check. Age did not seem to have any significant relationship to failure on the depth check. The average age was 38 years only because there is little turnover in personnel among this particular group, with the natural consequence that the same group tends to be on the same job for a number of years.

### SUMMARY AND CONCLUSIONS

The visual skill of depth perception can hardly be overstressed, and it is of paramount importance to include a depth check in every visual screening routine. Otherwise, the screening cannot be considered all-inclusive for evaluation purposes. This is illustrated by the finding of 17 men, among about 400 examined, who would be considered acceptable in any visual screening check were it not for their inability to exhibit a passable performance in depth perception. It appears important in the light of this experience that refractionists give careful consideration to any refractive error, no matter how small, as being a potential factor in causing a substantial decrease in visual efficiency.

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### GLAUCOMA PREVALENCE

"The National Society for the Prevention of Blindness estimates that approximately one million Americans have undiagnosed chronic simple glaucoma and states that every general practitioner should assume that one in 50 of his patients who are over 40 years of age probably has this disease." Early detection and treatment result in a favorable prognosis.

—EDITORIAL

*Journal of Medical Education*  
p. 413, July 1955

## Malignant Palatal Lymphoma Involving the Periodontium

JAMES E. CHIPPS, *Lieutenant Colonel, DC, USA*

C. JULES ROMINGER, *M. D.*

WILLIAM D. STANCUTT, *M. D.*

**T**HE radiosensitivity of localized lesions in malignant lymphoma is well known. However, if there has been spread of the lesion to adjacent structures, usually some distant metastasis also exists and the benefits of local therapy are but short-lived.

The following case is of interest because the local involvement was marked, but there is no evidence of generalized disease or local recurrence 2½ years after irradiation therapy.

### CASE REPORT

A 26-year-old man was returned from overseas with an ulcerating tumor of the oronasal structures, centering in the palate, which had been diagnosed as malignant lymphoma by biopsy.

**History.** Frequent episodes of acute nasal obstruction and sinusitis had occurred since the patient was 12 years old. There had been a sudden onset of left-sided earache and tinnitus 10 months before admission. The maxillary sinuses had been irrigated three months before, producing much purulent, foul-smelling material. Shortly afterwards, pain and swelling began in the roof of the mouth, and an ulcer appeared in the soft palate. The patient was hospitalized and treated with antibiotics. The swelling and ulcer continued to enlarge, and biopsies were obtained on separate occasions from the margin of the ulcer, the nasopharynx, and the tip of the inferior turbinate. Pending the results of the biopsies, cortisone and corticotropin (ACTH) were employed but without effect. A report of malignant lymphoma was obtained, and the patient was transferred from the overseas hospital to the zone of interior.

The transfer was completed on 5 October 1953. In the preceding few days, the patient had noted a rapid increase in the size of the ulcer, the swelling of the soft palate, and symptoms of nasal obstruction. In the preceding three months, there had been a 25-lb weight loss, which he attributed to an inability to masticate and a loss of appetite because of the foul-smelling oral ulcer.

1. The patient appeared chronically ill. A tumor mass of the nasopharynx and partially occluded the oropharynx so inspiration by mouth was slightly labored. The tumor mass measured approximately 9 by 5 cm, and a central area of ulceration measured by 2 cm. The lesion involved the entire hard and soft palate (figs. 1 and 2). The uvula was enlarged to twice its normal size. There was



Figure 1. Anterior portion of ulcerative lesion, hard palate.



Figure 2. Posterior portion of ulcerative lesion, soft palate and oral pharynx.

tumorous extension to the left tonsil and the upper pole of the right tonsil. A communication through the necrotic ulcer between the mouth and the floor of the right nasal cavity could be demonstrated by probe. All maxillary teeth were slightly mobile, although the marginal gingivae were at normal levels and the epithelial attachments had not receded. Nodes were palpable and tender deep to the mandibular angles bilaterally.

Radiographs showed destruction of the medial portion of the hard palate, opacity of the maxillary sinuses, and a polyp in the right frontal sinus.

Radiographs of the chest were normal, and the rest of the physical examination was not significant.

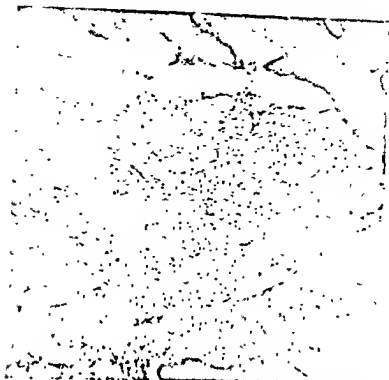
**Treatment.** The patient was presented to the hospital's tumor board. Irradiation therapy after extraction of the maxillary teeth was recommended.

Under general anesthesia on 6 October, a biopsy specimen was obtained from the edge of the palatal ulcer, and the dental extractions were accomplished. Although no attempt was made to include surrounding blocks of the maxillary bone in the routine forceps removal of the teeth, spongy white material which contained bony spicules clung to the apical half of each tooth as it was removed. An alveolectomy sufficiently extensive to permit approximation of the mucoperiosteal edges across the sockets was performed as a protective measure against the effects of irradiation.

Microscopically, the biopsy specimen from the palate (fig. 3) showed masses of atypical lymphocytes within the intratrabecular areas of cancellous bone. These lymphocytes presented a monotonous uniformity. There were no giant reticulo-endothelial cells. There was erosion of bone. A few fat cells were seen, but most of the fatty tissue was obliterated by the infiltrating tumor cells. A diagnosis of lymphosarcoma was made.

One of the extracted teeth with attached tissue was decalcified and sectioned. There was a diffuse infiltration of atypical lymphocytes in the tissue adjacent to the tooth root (fig. 4). Fragments of alveolar bone showed compression and erosion. Erosion of the cementum was seen in one area.

Irradiation therapy was accomplished between 7 October and 18 November, using the following factors: 200 kv, 20 ma, 50 cm target skin distance, Thoraeus filter half-value layer 1.95 mm Cu. Multiple portals were employed which encompassed the entire nasopharynx, all of the paranasal sinuses, and the lymph nodes in the upper cervical regions (fig. 5). A tumor dose of 3,000 roentgens was administered to all of these regions. Following this, additional treatment was delivered to residual tumor in the palate using a peroral lead cone and the following factors: 200 kv, 20 ma, 40 cm target skin distance, 0.5 mm plus



*Figure 3. Microscopic section from hard palate showing atypical lymphocytes and bone erosion. ( $\times 100$ )*

1.0 mm Al filter half-value layer 0.9 mm Cu, 1,500 r (in air). This raised the total tumor dose in the palate to 4,500 roentgens.

The patient tolerated this course of treatment well. The eyes and the oral commissures were protected by 4 mm of lead during the treatments. A second-degree erythema developed externally (fig. 6), and an ulcerative reaction developed in the palate. As the tumor regressed, there was a residual oronasal fistula at the junction of the hard and soft palate (fig. 7). By 14 December, all reactions had healed. There were no enlarged lymph nodes in the neck, and there was no evidence of residual neoplasia. The patient had gained 20 pounds during the treatment, and his general condition was good.

**Course.** A maxillary denture was constructed, which also served as a temporary obturator for the oronasal fistula. The patient was given physical disability discharge from the Army in April 1954 and subsequently observed at a Veterans Administration hospital at regular intervals.

Except for a chronic postnasal discharge there were no positive findings until January 1955, when radiographs disclosed a possible mass in the left maxillary sinus. A Caldwell-Luc procedure was performed on 21 January. The maxillary sinus was found to be free of masses. Multiple biopsies were performed, which revealed chronic



Figure 4. Microscopic section, area of tooth root apex, showing replacement of normal periodontium by atypical lymphocytes and possible destruction of cementum in one area. ( $\times 100$ )



Figure 5. Outline of external portals for radiation therapy. Figure 6. Second degree erythema following radiation therapy.



*Figure 7. Palate six weeks after beginning radiation therapy, showing regression of tumor and residual oronasal fistula.*

sinusitis but no evidence of recurrence of malignancy. Following this operation, an oroantral fistula developed. After one unsuccessful attempt at closure, the fistula was surgically closed in December. No recurrent malignancy was noted in either procedure.

In March 1956, a routine follow-up examination was again negative for recurrent malignancy. Examination at regular intervals will continue.

#### COMMENT

The lymphatics of the palate and the nasopharynx are the possible sites of origin in many reported cases of malignant lymphoma, and frequently there is a history of prolonged paranasal infection. When bone is involved in lymphosarcoma, such involvement is indicative of spreading rather than early disease.

In this case, the spread of disease was manifested by the perforation of the hard palate, loosening of teeth after replacement of the normal periodontium by tumor, fixation of the soft palate, fixation of the tonsils, enlargement of the upper cervical nodes, occlusion of the nasopharynx by a mass, and radiographic evidence of paranasal sinus involvement. Considering this regional spread and the nature of lymphosarcoma, a modified program of therapy directed at relief of symptoms was considered but rejected in favor of the attempt at curative therapy. The apparent absence of local recurrence or generalized disease after 2½ years is encouraging.

# Volkman's Contracture of the Lower Extremity

## A Complication of Patellar Tendon Transplantation

WALTER R. MILLER, *Captain, MC, USN*

**W**HENEVER an untoward incident occurs during a surgical procedure, there is an understandable reticence on the part of the surgeon to publish the case. If such information is given proper dissemination, however, it may assist in the recognition of premonitory signs in other patients, and possibly in the amelioration of residual damage. The following is such a case.

### CASE REPORT

A 17-year-old girl student, seen as an outpatient, complained of falling several times a week because of bilaterally dislocating patellos. This had been occurring for a number of years, but recently had become more frequent and, in view of her age, more embarrassing. Examination corroborated the diagnosis. The left patella could be completely dislocated off the lateral femoral condyle when the knee was in approximately 40° of flexion. The right patella could be subluxed only. Roentgenograms confirmed the suspicion that both lateral condyles were lower in profile than normal.

Transplantation of a bone block including the left patellar insertion was performed on 28 February 1952. The block was moved medially and slightly distally, and secured with a stainless steel screw. The usual freeing of the lateral aspect of the extensor mechanism was done, and followed by reefing along its medial border. In spite of having been dislocated frequently, the patella, although somewhat smaller than normal, presented an articular surface covered with normal, glistening cartilage. It rode in an accessory groove in the lateral condyle completely apart from the intercondylar notch. The medial femoral condyle was hardly recognizable as such. It was deformed and although it was partially covered with cartilage, the cartilage was covered with synovial membrane.

The completely uneventful procedure, which required 1 hour and 10 minutes from initial incision to skin closure, was accomplished under spinal anesthesia and with a pneumatic tourniquet of the Campbell-

From U. S. Naval Hospital, San Diego, Calif.



Boyd type inflated to 480. The tourniquet was applied to the thigh but not inflated until after preparation of the skin, and spiral application of an Esmarch rubber bandage. Thus the tourniquet pressure began not more than five minutes prior to the incision. Following the operation, a long leg cast was applied over ample sterile sheet wadding, after which the tourniquet was deflated and removed. Total tourniquet time was slightly less than 1 hour and 30 minutes. Good color and warmth returned to the toes immediately. The patient was taken to the ward in good condition and the casted leg was elevated on several pillows. About eight hours postoperatively, the surgeon was called by the surgical watch officer, who stated that the patient was having some pain in the leg but that the color and temperature of the toes were satisfactory. The surgeon recommended that the cast be split and spread slightly. There were no more phone calls that night, and it was believed that all was satisfactory.

The following morning at 1000 the patient was writhing with pain, although her operated leg from which the cast had been completely removed appeared essentially normal. Color of the leg and foot was good, and the temperature was equal to that of the other leg. Capillary return time in the toes was good, but neither posterior tibial nor dorsalis pedis pulsations could be felt and no oscillations were obtained by oscillometer except above mid thigh, where they were normal. The calf muscles were firm and somewhat tender, and the foot was in moderate equinus. The foot could not be dorsiflexed even to neutral, and much discomfort was caused by the attempt. The patient was quite clear in stating that her severe pain was in the entire leg from the site of the tourniquet distally. The tourniquet site in mid thigh was very tender, more so than any other area.

Hypesthesia to anaesthesia started 4 inches below the knee joint over the lateral aspect of the leg and about 8 inches below the knee joint on the medial side, the two areas joining anteriorly about 7 inches above the ankle joint. The skin over the calf and foot was almost completely anesthetic.

Consultation with the neurosurgeon and the anesthesiologist resulted in the use of continuous caudal block with Pontocaine (brand of tetracaine hydrochloride). This promptly relieved pain and caused the leg to be somewhat warmer than the unoperated leg. The patient also volunteered: "The leg feels like it's mine now down to just above the ankle." An oxygen tent used only for cooling was placed over the leg and the temperature maintained between 75° and 80°F.

On the following day consultation among the chiefs of the orthopedic surgical, general surgical, and neurosurgical services and two civilian consultants (neurosurgery and orthopedics) resulted in recommendation for lumbar sympathectomy. Following this procedure the leg was eradled in cotton in balanced suspension. The operative incision was unremarkable. The leg, including the heel, was warm, but the foot remained cool and pulseless although capillary return was adequate. Pain was reduced to moderate discomfort.

On about the third day, the calf muscles had reached a maximum of almost woody hardness and the picture of Volkmann's ischemic contracture was well developed. A small, quarter-sized area of blackened skin appeared on the heel, together with a small, blistered area overlying the tendinomuscular junction of the Achilles tendon. These both disappeared during the next two weeks.

In spite of gentle but persistent physiotherapy, followed later by a low leg brace with dorsiflexing foot spring, the foot over the next three months assumed a position of equinovarus of moderate severity ( $30^\circ$  of equinus). The operative wound healed without event. The patient could do a straight-leg raise with the knee locked in full extension in  $4\frac{1}{2}$  weeks postoperatively, and the patella was felt to ride medially in a normal position. Six months following operation she had a full range of motion in the operated knee, without effusion. The foot could be voluntarily dorsiflexed to about  $20^\circ$  below neutral and everted to neutral. There was gross rigidity and some residual induration in the posterior calf muscles; however, there was evidence of slight return of function in these. The level of hyperesthesia had moved distally at least 5 inches, but the entire foot was still anesthetic. Physiotherapy, including heel cord stretching, was continued and the patient was wearing a brace part time while waiting until surgical correction of the foot deformity would be indicated.

### DISCUSSION

The contracture I have described followed a relatively simple orthopedic operation on the anterior aspect of the leg performed under a properly applied pneumatic tourniquet. Search of the English literature revealed no other case of Volkmann's contracture of the leg following operation on the lower extremity, aside from a number of cases occurring as a complication of fracture of the femur. The condition is mentioned as a possibility by several authors while discussing the problem in the upper extremity.

To review in retrospect the situation as it confronted the operator at 10 o'clock on the morning following the operation, it was clear that splitting of the cast had not relieved the patient. Although she had required only two hypodermic injections of 10 mg of morphine and 60 mg of codeine during the first 20 hours postoperatively, she had complained of severe pain in the leg and of numbness in the foot and toes to such an extent that the entire cast had been removed in the early hours of the morning. At this time, according to the nurse's notes, "the toes and instep were blotched and blue." These were premonitory signs that could have been recognized and reported to the responsible surgeon. Whether earlier application of methods to reduce vascular spasm would have been effective in averting the residual damage will remain unknown, but it seems likely.

Much difference of opinion exists concerning when to explore the vessels in this condition. It was the opinion of those consulted in this case that since no trauma other than broadly distributed pressure from a pneumatic tourniquet had been inflicted on neurovascular structures, adequate blocking of the sympathetic outflow would be as effective or more so than operation in relieving vascular spasm. This view is supported by the report of Thomson and Mahoney<sup>1</sup> who state: "It seems significant that of all cases treated with sympathetic block (spinal anesthesia) only one was a failure and six were cured—muscle decompression with or without arterial exploration has proved to be of no value."

The opinion of Myerding<sup>2</sup> is of significance in cases that may become the subject for litigation: "Volkmann's ischemic contracture may result from injury when bandages, splints or casts of plaster of paris have not been used; this is a highly important fact, from a medicolegal point of view . . . I should like to emphasize again the great importance of the fact that Volkmann's ischemic contracture may result when there is no fracture and when no splint, bandage or cast has been applied."

#### SUMMARY

A case of Volkmann's contracture of the lower extremity following a relatively simple orthopedic procedure is presented. No report of a similar case could be found on search of the English literature. Early recognition of premonitory signs and symptoms of this complication is of the greatest importance, so that early treatment can be instituted and residual damage be reduced to a minimum.

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2. Myerding, H. W.: Volkmann's ischemic contracture. *J. A. M. A.* 94: 394-400, Feb. 8, 1930.

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"Internal medicine is the most popular medical specialty in the Army with surgery as a close second. Seventeen per cent of the 681 medical officers, both Regular Army and Reserve, holding specialty certification are diplomates in internal medicine. About fifteen per cent are in the surgical group. The remaining 68 per cent is distributed among 23 specialties and subspecialties."

—Technical Liaison Office,  
Department of the Army,  
Office of the Surgeon General,  
Information Release of 19 July 1956

# Situs Inversus of Gastro-intestinal Tract

## Complication by Partial High Intestinal Obstruction

RICHARD R. PICHEL WARNER, *Captain, USAF (MC)*

**T**RANSPOSITION of the stomach alone, or with situs inversus of all the infradiaphragmatic viscera, is ordinarily asymptomatic although sometimes associated with eventration of the right diaphragm.<sup>1</sup> Situs inversus of the intra-abdominal organs occurs once in every 6,000 to 8,000 individuals<sup>2</sup> and is more common than partial transposition or incomplete rotation of a portion of the gastro-intestinal tract. The latter condition, however, frequently produces symptoms, and the majority of such patients are brought to medical attention during early infancy. Occasionally an individual who has symptoms resulting from anomalous rotation of a portion of the gastro-intestinal tract will not seek medical attention until early adulthood because his symptoms may have been mild, although chronic. Only in recent years has it been appreciated that such congenital anomalies need not produce clinical manifestations until early adult life.<sup>3,4</sup> Since the majority of military personnel are in this age category, the military physician should be acquainted with the symptoms and realize that such conditions may occur in young adults, and are not exclusively confined to infants and children.

### EMBRYOLOGY

In order to understand the genesis of the group of conditions resulting from faulty rotation of the gastro-intestinal tract, it is necessary to have an understanding of the main features of the process whereby the gastro-intestinal tract attains its final asymmetrical arrangement.<sup>5,6</sup>

The digestive tract of the embryo is divided into a foregut, midgut, and hindgut. The midgut extends from the third portion of the duodenum to the midtransverse colon. Distal to this area is hindgut, and proximal to it is foregut.

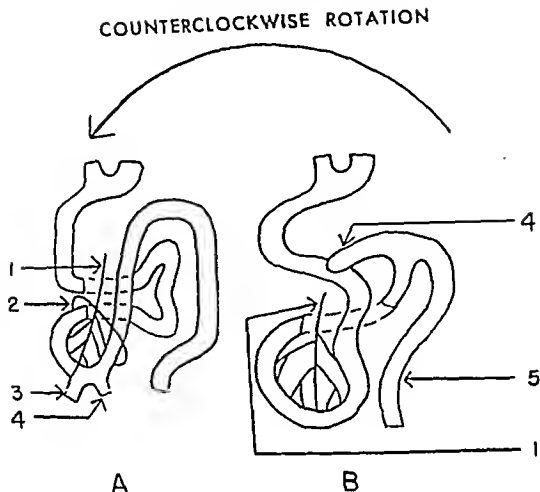
At the fourth week of fetal life, the primitive gut hangs in the midline supported by a common dorsal mesentery. A fusiform dilatation, the future stomach, appears, and just below this the liver diverticulum and the bud that gives rise to the pancreas develop. The primitive stomach becomes further dilated so that

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From 3750th U. S. Air Force Hospital, Wichita Falls, Tex.

its right surface is directed backward with the greater curvature facing downward and to the left. Due to this rotation, the liver and pancreas are carried from the midline to their respective final positions. If the stomach and descending portion of the duodenum rotate to just the opposite position from that described, the liver, pancreas, and spleen will then be carried along and be situated in such a way that they present a mirror image of their normal positioning; *i. e.*, *situs inversus*.

While the development and rotation of these portions and growths from the foregut are occurring, development and migration of the midgut is also underway. The midgut is divided into a prearterial portion, which extends from the third portion of the duodenum to the vitelline duct, and the postarterial portion, which extends from the vitelline duct (or Meckel's diverticulum) to the midtransverse colon. Between the sixth and tenth weeks the gut grows too rapidly for the celomic cavity to accommodate it. This results in the protrusion of a part of the midgut into the base of the umbilical cord (fig. 1A). By the tenth week, however, the peritoneal cavity becomes large enough to contain this portion of the midgut, and it is withdrawn from the base of the umbilical cord. As it enters the abdomen, it rotates in a counterclockwise direction so that the postarterial portion of the midgut (the segment from vitelline duct to midtransverse colon) is situated in the left side of the abdomen. This anticlockwise rotation continues after the midgut is entirely within the abdomen so that the cecum, which initially is in the left midabdomen, migrates to the left epigastrium and thence to the right epigastrium (fig. 1B), and finally swings around to its adult position in the right lower quadrant. The cecum and ascending colon then acquire their peritoneal reflections and attachments in the right side of the abdomen. At the same time, the small bowel, which also has been rotated in a counterclockwise direction, becomes firmly attached to the posterior abdominal wall by its mesentery.



**Figure 1. Embryology.** (A) Protrusion of a portion of the midgut into the base of the umbilical cord at 6 to 10 weeks' stage of development. (B) Midgut has re-entered abdomen at 10 to 12 weeks' stage of development and has undergone partial counterclockwise rotation so that cecum lies in right upper quadrant. This rotation will normally continue and will carry the cecum to the right lower quadrant, its final position.

1-Superior mesenteric  
artery  
2-Umbilical orifice

3-Vitelline duct  
4-Cecum  
5-Descending colon

midgut may not occur. Most of the midgut, and particularly the postarterial portion, may still go to the left side of the peritoneal cavity upon entering the abdomen, but then the process of counterclockwise rotation may not go to completion, perhaps because of the large liver mass located in the left upper quadrant. This may then result in the cecum and most of the colon being located in the left side of the abdomen; the cecum may be mobile, and there may also be nonfusion of the mesentery of the midgut so that the small bowel hangs on a pedicle of the superior mesenteric artery.

Therefore, three types of abnormalities may occur to the midgut in association with or without situs inversus of the stomach and liver: (1) return of the midgut to the abdomen without any rotation;

2 inches in height and weighed 170 pounds. His usual weight had been 195 pounds. Vital signs were normal. Hydration was only fair. There was a prominent sternum and a slight pigeon-breast type of sternal deformity. The remainder of the physical examination disclosed no significant abnormalities.

**Laboratory Findings.** Peripheral blood studies at the time of admission revealed a red blood cell count of 3.7 million per  $\mu$ l; hemoglobin was 11 g per 100 ml; hematocrit, 52.5 ml per 100 ml; reticulocyte count, 1.1 per cent; and white blood cell count, 13,400 per  $\mu$ l with a slight shift to the left. The stool contained traces of occult blood. Urinalysis showed no abnormalities. Determinations of the fasting blood sugar, serum chlorides, and basal metabolic rate all yielded values within normal limits. The gastric contents after fasting contained 65° of free acid, and after histamine, 90° were present. An electrocardiogram showed no significant abnormalities. A roentgenogram of the chest was normal. The heart was in its normal position on the left. No defects in the diaphragms were noted. An upper gastro-intestinal series demonstrated situs inversus of the abdominal organs and an anomalous course of the duodenum. There was spasm of the pylorus and the duodenal bulb could not be well outlined. No deformity or ulcer crater could be seen. Several more upper gastro-intestinal series and roentgenograms of the small bowel were taken with the intent of studying the anomalous duodenum in detail. Barium was introduced by Levin tube in one of these studies. The duodenal bulb was well visualized and showed no deformity or ulceration. The anomalous course of the duodenum was well demonstrated (fig. 2), and considerable dilatation of the bulb and first portion of the duodenum was seen. A point of obstruction was visualized low in the descending limb of the duodenum (fig. 3). At this point, the transverse mucosal folds were converted into vertical striations. There was delayed passage of barium past this point. The picture was felt to represent partial obstruction due to extrinsic pressure as might be caused by a mesenteric band. Beyond this area, there was a reversed loop of the duodenum before it passed into the proximal jejunum, which went high and posteriorly on the right side of the abdomen. The cecum was low on the left side of the abdomen. A congenital anomaly of the lumbar spine consisting of failure of segmentation of L5 and S1 was present. An intravenous pyelogram showed two normal kidneys and ureters.

**Course in Hospital.** The patient was initially maintained on a nutritious liquid diet and amacids. After two weeks, symptoms of obstruction disappeared and he was allowed a more nearly regular diet. His work-up was completed, and on 9 June 1955 he was operated on.\*

At operation, as seen on the roentgenograms, his abdominal viscera were completely transposed from left to right in a mirror image of the normal arrangement. The cecum was completely mobile and the small

\*Operation was performed by Capt. Gilbert L. Chamberlin, USAF (MC).



*Figure 2. Roentgenogram demonstrating situs inversus of the stomach and anomalous course of duodenum.*

intestine's mesentery was attached to the posterior abdominal wall for only eight centimeters. The appendix contained several fecaliths. The jejunum and ileum were normal as was the ligament of Treitz. The duodenum was elongated to about 15 inches and was enveloped in peritoneal folds, which at the most dependent portion of the duodenum had kinked this loop of gut in a sharp 180° angle. This point of sharply angulated gut was just below the attachment of the duodenum to the pancreas. From this point, the duodenum crossed itself, ran laterally upward and back across itself again, and then posteriorly to the superior mesenteric artery to reach the ligament of Treitz. Two normal kidneys were present, but a right retroperitoneal mass was noted and proved to be an accessory kidney. The duodenum was mobilized and its kinked dependent portion was straightened out by freeing it from the enveloping mesenteric folds. It was felt that this would be sufficient to relieve the patient's symptoms of recurrent partial intestinal obstruction. The appendix was also removed.

Postoperatively, the patient's convalescence was entirely uneventful, and three weeks after surgery he was returned to duty. When seen three months later, he was entirely free of gastro-intestinal symptoms and eating a regular diet.





*Figure 3. Roentgenogram demonstrating considerable dilatation of the duodenal bulb and first portion of the duodenum, with point of partial obstruction in descending limb of duodenum just proximal to sharp angulation.*

It was believed at the time of operation that, although incomplete, the attachment of the small intestine's mesentery to the posterior abdominal wall was sufficient to render the possibility of volvulus unlikely. Therefore, no attempt was made to immobilize the small bowel by further attaching its mesentery. The increased incidence of duodenal ulcer in association with partial obstruction at the duodenum due to congenital bands or adhesions<sup>7</sup> was appreciated. Hence, roentgenographic studies were meticulously performed in the search for an ulcer. Such ulcers are felt to be due in large part to stasis. Our patient may have had such an ulcer in the past or at the time of admission, and its bleeding would explain the mild anemia and occult blood in the stools found when he was hospitalized. Such an ulcer at the time of admission could have been a very superficial one and could have healed prior to operation. In such ulcer cases, since stasis is the major causative factor, the surgical relief of the duodenal obstruction is usually sufficient to result in cure.

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### THE FOUR STAGES OF KNOWLEDGE

"Where are we in our efforts to understand arteriosclerosis? Well, certainly not very far. Discovery in general can, I think, be divided into four stages. The first is the period of uncoordinated fact collecting—the naturalist or "butterfly net" period. This is the period of magnificent indifference; in it lie the seeds of discovery but the inner structure is barely discernible. The second is the period of controversy—the "rhubarb stage" of the ball game. This stage is often called one of "scientific controversy" to make it sound less like the rhubarb that it really is. It has the merit that there is probably something worth arguing about if this stage is reached. It is healthy so long as young investigators understand its nature and not take it, or themselves, too seriously. The third is the period of definition and clarification—the "white of an egg stage" because someone clarifies the problem by precipitating the irrelevant sediment. The fourth and last is the period of solution or fruition—the "bavo stage" in which everyone, or nearly everyone, agrees, applauds and goes home and from then on nobody does much more about it, except in some rare cases, collects royalties.

"I think you will agree that research in arteriosclerosis stands about half way between the first and second stages."

—IRVINE H. PAGE  
in *Minnesota Medicine*, p. 743,  
Nov. 1955

## A MESSAGE FROM THE A. M. A.

A recently published letter from an anonymous captain received wide circulation among military personnel. The correspondent attempted to establish that the basic cause of the acute shortage of doctors in the armed services is that there are simply not enough available physicians in this country. To support his opinion, the captain accused the American Medical Association of limiting the number of medical schools as well as the number of licensed physicians. Specifically, he charged that (1) the A. M. A. began a policy 50 years ago of closing down medical schools; (2) only 1 out of every 10 or 20 applicants is admitted to a medical school; and (3) the A. M. A. started a policy of refusing to permit Americans who are graduates of European medical schools to take state medical board examinations.

Statements like this are not new, and unfortunately they have been repeatedly made in public print. Are they fact or fiction? Well, let's examine the record and see.

As to the first charge, *the American Medical Association has never closed any medical school*. In fact, it has neither the authority nor the desire to control the growth of medical schools. Some 56 years ago, a report on the unsavory quality of medical education in the United States was published as a result of a study sponsored by Dr. Abraham Flexner. The report clearly revealed that only about one third of the schools then in existence were offering a satisfactory medical education adequate to meet the needs of that period. The report shocked reputable medical educators, and their actions brought speedy results. A vigorous house cleaning ultimately wiped out about two hundred fly-by-night schools which were either diploma mills or had facilities, personnel, or financing inadequate to offer a medical education suitable for that period. From 1910 until about 1928, medical schools were classified as A, B, or C in terms of their over-all potentialities; B or C schools either improved or closed their doors. This type of classification was discontinued in 1928, and since that time medical schools have been approved or not approved.

The American Medical Association Council on Medical Education and Hospitals has worked closely with the Association of American Medical Colleges in constant efforts to assist in developing and maintaining sound standards of medical education

From the Council on National Defense of the American Medical Association. The views and opinions expressed are not necessarily those of the Department of Defense.—  
Editor.

in the United States in the interests of the American public, which the graduates of our medical schools must serve. These two organizations have exerted great influence in medical education. They have co-operated in stimulating and encouraging new medical schools, and have assisted in the improvement of those in existence by establishing sound, basic essentials of medical education, as well as by consultations, advice, and survey evaluation.

The number of approved medical schools in the United States increased from 66 in 1910 to 81 in 1955, a growth of 22.7 per cent. On the basis of new schools now under development, the number will have increased 30 per cent by 1960. In 1955, there were 28,583 students enrolled in medical schools as compared with 12,530 in 1910. The number of physicians graduated from approved medical schools since 1910 has far outstripped the growth of the over-all population of the United States. While our general population was increasing 60 per cent, the supply of doctors increased 120 per cent. Today, we have not only more doctors, but far better care than a generation or two ago. Physicians now treat a great many more patients and treat them more efficiently.

The second charge is likewise incorrect and not supported by the facts. Simple arithmetic establishes that *over half of all applicants were accepted into medical schools in 1953-1954 and in succeeding years*. The exact ratio of admissions to the number of applicants for 1953-1954 was 1 to 1.97, or 7,749 admissions out of a total of 14,678 applicants; for 1954-1955 it was 1 to 1.93, or 7,556 admissions out of a total of 14,538 applicants. Several years ago, publicity was given to the number of applications filed rather than to the total number of applicants filing them. This was incorrectly interpreted to mean that only 1 out of every 10 or 20 applicants is admitted to a medical school. The fact is that each applicant usually applies to some 2 to 4 or 5 medical schools. This means, of course, that the number of applications filed represents many times the number of people who are actually applying for admission to a medical school. For example, in 1953-1954 there were 48,556 applications for admission to medical schools, made by 14,678 individuals. Each applicant filed an average of 3.3 applications. Even at the peak period of admission to medical schools in 1948-1949, when large numbers of young men were being released from military service, the ratio of applicants to admissions was never higher than 3.6 to 1.

The third charge is a fallacy. By state statutes, it is the function and authority of the individual states to determine who shall practice within their borders, and to maintain high standards of medical practice in accordance with their respective rules and

regulations. The State Boards of Medical Examiners are independent agencies, and *the licensing in each state is done on the basis of the individual medical practice acts of the states concerned and the determinations of the various individual licensing bodies.* There are 20 medical licensing boards that permit licensure of foreign-trained physicians. On the other hand, foreign-trained physicians are not eligible for licensure by 12 boards. Special requirements for foreign-trained physicians are specified by 18 boards, while 16 boards have varying exemptions. In the final analysis, medical licensure in the United States is a "sovereign state right" that is entirely under the jurisdiction of the governments of the individual states.

The captain's suggestion for the creation of a medical academy to produce medical officers for the Armed Forces is not new. This idea has been carefully considered for a number of years by Congress, the military services, the medical profession, and groups of medical educators. All who have looked into the problem agree that, if the services are to produce their own physicians, it is far better and cheaper to subsidize the education of medical students in existing medical schools than for the Federal government to create, equip, and staff a separate medical academy. Furthermore, all groups agree that the present diversification in background and training of medical officers who have graduated from a number of different medical schools is a distinct advantage to military medicine.

Based on these decisions, the military services recommended legislation to the last Congress that would have permitted the subsidization of medical students under contract to become career military medical officers upon the completion of their training. This recommendation had the whole-hearted support of the medical profession.

Before Congress had completed final action on the proposal, however, the military services found it possible to establish a program of subsidizing the training of selected senior medical students in return for commitments of military service. This program is now in operation with the full support of the medical profession and medical educators. Studies are currently under way to determine the feasibility of extending this program to include junior medical students as well.

Programs of this type, together with the recently enacted career incentive bill for medical officers, should prove of great assistance in solving the basic problem.

## EMINENT ARMY UROLOGIST DIES

Colonel James C. Kimbrough, MC, USA (Ret.), age 68, died on 19 August 1956 at Walter Reed Army Hospital, where he had served for the past 10 years.



From 1946 to 1953, he was chief of the hospital's Urology Service. In August 1953, upon retiring from the U.S. Army after 36 years of service, he was designated by an Act of Congress as consultant in urology to Walter Reed Army Medical Center, "...in recognition of the outstanding service and contribution made to the science of medicine and surgery... and to provide that his mature professional judgment and long experience may continue to remain available to the public service...."

A native of Madisonville, Tenn., he was graduated from Hiwassa College and from Vanderbilt University School of Medicine before entering the military medical service in July 1917. Since 1921, he served almost exclusively as chief urologist at various Army hospitals, including four duty tours at Walter Reed. He was also Chief of the Professional Services Division in the Office of the Chief Surgeon, European Theater of Operations, from 1942 to 1945.

In World War I, Colonel Kimbrough received the Purple Heart award, and a Meritorious Service Citation signed by General of the Armies John

J. Pershing. In World War II, he was awarded the Legion of Merit and the Bronze Star Medal. In 1952, he was awarded a plaque by the American Urological Association, of which he was a member, in recognition of his "contributions to the advancement of science and practice of urology" and for his "efforts in promoting pleasant working relations between civilian and military medicine," and in 1955 he was elected president of that association's Mid-Atlantic Section, the first time in the association's history that a former Army officer had held the position. Since his death the annual postgraduate refresher course in urology at Walter Reed has been named in his honor.

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#### FIRST INTERNATIONAL CONGRESS OF NEUROLOGICAL SCIENCES

The First International Congress of Neurological Sciences will be held in Brussels, Belgium, 21-28 July 1957. This Congress is the first integrated international convention of all independent international congresses of several neurological disciplines. Meeting simultaneously in Brussels under the new co-ordinated program are Sixth International Neurological Congress, Fourth International Congress of Electroencephalography and Clinical Neurophysiology, Third International Congress of Neuropathology, First International Congress of Neurological Surgery, Third Meeting of the International League against Epilepsy, and Second Symposium Neuroradiologicum.

The scientific program will highlight two major symposia of common interest to the Congress: Extrapyrarnidal Disease, by Professor Raymond Garcin of Paris, and the Significance and Interpretation of Modifications of the Conscious State, by Sir Geoffrey Jefferson of London. Special interest symposia will include Multiple Sclerosis, under the Chairmanship of Professor H. Houston Merritt of New York.

Further information may be obtained from Dr. Pearce Bailey, Secretary, Committee for the United States of the Sixth International Neurological Congress, National Institutes of Health, Bethesda 14, Md.

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#### DEATH

ALTEE, Miriam Elizabeth, Lieutenant, NC, USN, of Columbia, S. C.; Chief Nurse at U. S. Naval Air Station, Norfolk, Va.; graduated from the Petersburg Hospital School of Nursing, Petersburg, Va., 12 August 1937; appointed, Nurse, in the U. S. Navy and ordered to active duty 6 May 1940; died 24 August 1956, age 43, at the U. S. Naval Hospital, Portsmouth, Va., of metastatic carcinoma of the vertebrae.

# Promotions of Officers

The following officers of the military medical services on active duty in the Army, Navy, and Air Force have recently received temporary promotions to the rank indicated.

## MEDICAL CORPS

ACKERMAN, Gustave A., Capt., USA  
 ADDISON, James A., Capt., USN  
 ADLER, Sheldon P., Capt., USA  
 AGUILO-DIER, Jose, Capt., USA  
 AISEN, Philip, Capt., USA  
 ALBERT, Chalom A., Capt., USA  
 ALDEN, Alfred M., Capt., USA  
 ALONSO, Cespedes T., Capt., USA  
 ANDERSON, Roland G., Capt., USA  
 ARDAM, Ira H., Capt., USA  
 ASHFORD, Thomas P., Capt., USA  
 ATORDEGAN, A. A., Capt., USA  
 BAER, Robert B., Capt., USA  
 BAKER, John R., Capt., USA  
 BALLENTYNER, Lord P., Capt., USN  
 BARLOW, Peter P., Capt., USA  
 BARR, Solomon E., Capt., USA  
 BASHAM, Byron E., Capt., USN  
 BATTLE, William G., Capt., USA  
 BATHIAH, Sanford, Capt., USA  
 BEQUEST, Edey C., Capt., USA  
 BEITHON, Paul J., Capt., USA  
 BELGRADE, Joseph E., Capt., USA  
 PELVILLE, Donald R., Capt., USA  
 BENNETT, Stephen L., Capt., USA  
 BERLACHER, Franz J., Capt., USA  
 BERNSTERN, Eugene F., Capt., USA  
 BERRY, Reginald V., Capt., USN  
 BETHANY, Joe J., Jr., Capt., USA  
 BEVER, Lloyd J., Capt., USA  
 BIERLEY, John R., Capt., USN  
 BINSTOCK, William, Capt., USA  
 BLANCHARD, Robert E., Capt., USA  
 BLOCK, Alvin L., Capt., USA  
 BLOOM, David M., Capt., USA  
 BOETTGER, Hans F., Maj., USA  
 BOLT, Donald A., Capt., USA  
 BOUGHTER, Richard L., Capt., USA  
 BOWLEY, James R., Capt., USA  
 BOWLES, Richard P., Capt., USA  
 BOWMAN, F. C., Jr., Capt., USA  
 BOYD, George K., Capt., USA  
 BOYERS, James H., Capt., USN  
 BRADSHAW, Robert H., Capt., USN  
 BRAGMAN, Robert D., Capt., USA  
 BRENT, Robert L., Capt., USA  
 BRILL, Norman R., Capt., USA  
 BRODY, Sidney I., Capt., USN  
 BROMBERG, Philip A., Capt., USA  
 BROOKS, Donald L., Capt., USA  
 BROWN, Ralph R., Capt., USAF  
 BUCKLEY, James A., Capt., USA  
 BUIDENS, Warner D., Jr., Capt., USN  
 CAMBER, Charles G., Capt., USA  
 CAMPBELL, Donald A., Capt., USA  
 CAMPBELL, Donald F., Capt., USA  
 CANAGA, Bruce L., Jr., Capt., USN  
 CANTER, Hall G., Capt., USA  
 CANTRELL, William C., Capt., USN  
 CARFFT, William M., Capt., USN  
 CASTEEL, Byron D., Capt., USN  
 CASTOR, Louis H., Capt., USA  
 CHANDLER, Arthur, Jr., Capt., USA  
 CHERVENAK, William, Capt., USA  
 CHRISTENSEN, Rolan A., Capt., USN  
 CHRISTOPH, Robert F., Capt., USN

COLEMAN, John W., Capt., USA  
 COLLIER, Robert H., Capt., USA  
 COMPTON, William A., Jr., Capt., USA  
 CONRAD, Robert A., Capt., USA  
 COOKE, Joseph P., Capt., USN  
 COCK, Thomas W., Capt., USA  
 COCKLEY, Roy G., Jr., Capt., USAF  
 COOPER, Edward P., Capt., USA  
 COFF, Donald H., Capt., USA  
 COFFMAN, Robert C., Capt., USA  
 CORBELL, Martin C., Capt., USA  
 CROCKETT, Peter F., Capt., USA  
 CUTHBERT, James F., Capt., USA  
 CURRIER, Albert E., Capt., USA  
 DALEPPE, C. F., Maj., USA  
 DAVIS, Joseph P., Capt., USA  
 DEGENER, L. H., Maj., USA  
 DEGRUIT, Henry F., Capt., USA  
 DILLER, Matthew F., Capt., USA  
 DUNN, Joel R., Capt., USA  
 DYKING, John J., Capt., USA  
 DIXON, George L., Jr., Capt., USA  
 DIXON, Leon H., Capt., USA  
 DOOGON, William P., Capt., USA  
 DODD, Arthur R., Capt., USA  
 DORFMAN, Howard D., Capt., USA  
 DOTOL, Franklin, Capt., USA  
 DOTSON, C. C., Jr., Capt., USA  
 DUFFLER, Gerald J., Capt., USN  
 DUFFY, John L., Capt., USA  
 DUFFY, Thomas L., Capt., USN  
 DUNLEAVY, James D., Capt., USA  
 ECHERSON, Edward H., Capt., USA  
 EDMONDSON, Robert C., Capt., USA  
 EISENTHAL, Reuben, Capt., USA  
 ELLIOTT, Edward H., Maj., USA  
 ELSON, Charles E., Capt., USA  
 ERNS, Henry R., Capt., USN  
 ECHLEMAN, Elias K., Capt., USA  
 FALLER, Bruce D., Capt., USA  
 FERNANDEZ, Manuel C., Capt., USA  
 FILIPOVICH, Orest F., Capt., USA  
 FLETCHER, Robert G., Capt., USA  
 FOLEY, Michael J., Capt., USA  
 FONTANA, Roger J., Capt., USA  
 FORD, George W., Capt., USA  
 FOREMAN, Lee S., Capt., USAF  
 FRANE, John D., Capt., USA  
 FRAZER, Joe W., Jr., Capt., USA  
 FRIEDMAN, Herbert S., Capt., USAF  
 FRUEHOLTZ, Frederick, Capt., USA  
 FUJII, Tetsuro, Capt., USA  
 GARNES, Leonard M., Jr., Capt., USAF  
 GALYON, James T., Capt., USA  
 GANZ, Aaron, Capt., USA  
 GARCIA, Margarida M., Capt., USA  
 GARZA, Harold R., Capt., USA  
 GELINAS, Joseph A., Maj., USA  
 GERBER, Marvin L., Capt., USN  
 GEORGESEN, Lloyd W., Capt., USA  
 GEYER, Charles H., Capt., USA  
 GOLDBERG, Arnold L., Capt., USA  
 GOLDBERG, Morris M., Capt., USA  
 GOLDSBOROUGH, John, Capt., USA  
 GOLDMAN, Armond S., Capt., USA  
 GOLDSMITH, Richard, Capt., USA



## MEDICAL CORPS—Continued

GOLDSTON, Edgar C., Capt., USA  
GODIN, Robert F., Capt., USA  
GOUGH, James B., Capt., USA  
GRANT, Lloyd J., Jr., Capt., USA  
GRAFF, Alan G., Capt., USA  
GRAY, Nicholas C., Capt., USA  
GREENTH, John A., Apt., USA  
GREEN, William H., Capt., USA  
GRIFFITH, Philip C., Jr., Apt., USA  
GRIFFITH, Alex M., apt., USA  
GUERREY, Herbert A., Capt., USA  
HAAS, William E., apt., USA  
T. HARRIS, Wm. J., Maj., USA  
HARRISON, Walter L., apt., USA  
HEATH, Ralph, apt., USA  
HELGESEN, Kenneth D., apt., USA  
HERNANDEZ, Joseph P., apt., USA  
HICKMAN, Charles E., apt., USA  
HILL, BOB G., apt., USA  
HILFERT, John R., apt., USA  
HINDS, George T., Capt., USA  
HINTON, Henry S., apt., USA  
HUNT, John I., apt., USA  
HARTLEY, Joseph P., apt., USA  
HARDING, Thomas J., apt., USA  
HARNETT, Jan B., Capt., USA  
HAYES, Donald L., apt., USA  
HAWKINS, Gerald Y., Capt., USA  
HAYWOOD, Theodore K., Capt., USA  
HEADEN, Clifton E., Jr., Capt., USA  
HENNING, Hugh S., Capt., USA  
HETTING, Tolson A., Capt., USA  
HISCOCK, Frank N., Capt., USA  
HOOGSTEDT, Robert E., Capt., USA  
HOTTON, Samuel H., Jr., Capt., USA  
HOOPER, Alvin V., Capt., USA  
HOLMES, Herbert A., Capt., USA  
HOMBY, Gerald L., Capt., USA  
HORNADAY, William H., Jr., Capt., USA  
HORLEY, Howard T., Capt., USA  
HOSCHKE, Louis J., Jr., Capt., USA  
HUNT, Warren H., Capt., USA  
HUSTON, J. Wilson, Capt., USA  
ITANI, Masashi, Capt., USA  
JACOBSON, David C., Capt., USA  
JAFFE, Leonard P., Capt., USA  
JOHNSTOWN, John M., Capt., USA  
JOHNSON, Carl V., Capt., USA  
JONES, Thomas L., Jr., Capt., USA  
KADEFER, Donald B., Capt., USA  
KAUFER, Julian K., Capt., USA  
KAMM, Edward J., II, Capt., USA  
KARAS, Joseph J., Capt., USA  
KARR, Walter J., Capt., USA  
KAY, Jacob L., Capt., USA  
KAYE, Melvin M., Capt., USA  
KILGORE, Bassett E., Capt., USA  
KILLORAN, Paul J., Capt., USA  
KILPATRICK, S. C., Jr., Maj., USA  
KIMBOURGH, E. E., III, Capt., USA  
KIMBEROUGH, John G., Capt., USA  
KING, Elmer R., Capt., USN  
KING, Houston C., Capt., USA  
KING, James C., Capt., USA  
KING, James D., Capt., USN  
KING, John B., Jr., Capt., USA  
KIRSEY, Jack L., Capt., USN  
KIRBY, Lowry D., Capt., USA  
KIRBY, Taylor H., Jr., Capt., USA  
KISSANE, John M., Capt., USA  
KLAUSENSTOCK, Oskar, Capt., USA  
KOENIG, Reuben E., Capt., USA  
KOFSTER, Herman L., Capt., USA

FCHEN, Joseph P., Jr., Capt., USA  
FOZKACAPAL, B. M., Capt., USA  
FRATTI, William L., Capt., USA  
GUMPHREY, Lewis A., Capt., USA  
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LANTIERE, Alfred H., Jr., Capt., USA  
LANO, Frederick W., Capt., USA  
LANGFORD, Thomas E., Capt., USA  
LARSEN, Andrew F., Capt., USA  
LAURENCE, Robert C., Capt., USA  
LEACHMAN, James T., Capt., USA  
LEE, Arthur G., Capt., USA  
LEITCH, John R., Capt., USA  
LEWIS, Thomas D., Capt., USA  
LIEM, La Son, Capt., USA  
LINCOLN, Howard, Jr., Capt., USA  
LONGHORN, Herbert H., Capt., USA  
LOTT, Charles, Capt., USA  
LOWERY, John L., Capt., USA  
LUKE, Benjamin E., Capt., USA  
LYONS, John, Capt., USA  
MACDONALD, Bill, Capt., USA  
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MALONE, Edward H., Capt., USA  
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MAXSON, Fred, Capt., USA  
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MARK, Daniel O., Capt., USA  
MARY, Ann S., Capt., USA  
MAS, Joseph, Capt., USA  
McALESTER, William F., Capt., USA  
McCARTHY, Richard P., Capt., USA  
McCAITH, Lawrence, Capt., USA  
McCAUGHEY, Hugh V., Capt., USA  
McCUBBERY, D. R., Capt., USA  
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McFADDEN, Wayne L., Capt., USA  
McFARLAND, Donald, Capt., USA  
McGUIRE, Richard M., Capt., USA  
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McNUITY, John P., Capt., USA  
McPARTLAND, Frank C., Capt., USA  
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MELNICK, Gilbert S., Capt., USA  
MELITZER, Jay I., Capt., USA  
MENCKE, Richard J., Capt., USA  
MERSCHE, William J., Capt., USA  
MILLER, Arthur V., Capt., USN  
MILLER, Hubert H., Capt., USA  
MILLMAN, Norton K., Capt., USAF  
MOORE, Walter S., Capt., USA  
MOORE, Jeff R., Capt., USA  
MOORE, Jerome A., Capt., USN  
MORGAN, Zeblun V., Capt., USA  
MORRIS, Albert E., Capt., USN  
MOYES, James K., Capt., USA  
MUGLER, F. R., Jr., Capt., USA  
MULLIN, Charles S., Jr., Capt., USN  
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 NEEDLEMAN, H. L., Capt., USA  
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 NOVA, Phillip L., Capt., USN  
 O'BRIEN, Richard F., Capt., USA  
 O'DONOGHUE, John A., Capt., USN  
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 OER, James M., Capt., USA  
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 PHILLIPS, John H., Capt., USA  
 PHILLIPS, Philip B., Capt., USN  
 PINTO, Joseph C., Capt., USN  
 PITARO, Nathan A., Capt., USA  
 PITTS, Frederick W., Capt., USA  
 PLYMYER, Ray F., Capt., USA  
 POLCYN, Benedict M., Capt., USA  
 POCHOPPEDAK, Henry, Capt., USA  
 POCHI, Cho T., Capt., USA  
 PORTENAR, Myron A., Capt., USA  
 PORTER, William M., Capt., USA  
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 RAHMING, Harry E., Capt., USA  
 RANDALL, David A., Capt., USA  
 RAU, David H., Capt., USA  
 RAWITCH, Marvin A., Capt., USA  
 REAVEN, Gerald M., Capt., USA  
 REESE, Norman O., Capt., USA  
 REHM, Robert A., Capt., USA  
 RICCI, Mario G., Capt., USA  
 RICHIE, Eldred T., Jr., Capt., USA  
 RICHMOND, Roland W., Capt., USA  
 RIDDLE, Lindsay R., Capt., USN  
 RIGGLE, Allen C., Capt., USA  
 ROBERTS, Robert E., Capt., USA  
 ROBBIE, William A., Capt., USN  
 RODGERS, George H., Capt., USA  
 ROEVER, Harold D., Capt., USA  
 ROGER, Sheldon, Capt., USA  
 ROLAND, Frederick H., Capt., USAF  
 ROSE, Patrick F., Capt., USA  
 ROSENBLATT, Morton, Capt., USA  
 ROSENBLUM, Leigh E., Capt., USA  
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 SANDERS, Graydon C., Capt., USA  
 SANDNER, Donald F., Capt., USA  
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 SCHWARTZ, Norman H., Capt., USAF  
 SCHWITTEL, F. D., Jr., Capt., USA  
 SEATRAVER, Gerald C., Capt., USA  
 SEAL, John R., Capt., USN  
 SELFER, Richard A., Capt., USA  
 SEITZ, Vance F., Capt., USN  
 SHALICO, Louis, Capt., USN  
 SHERIDY, Alfred M., Capt., USA  
 SETHURU, Prasad M., Capt., USN  
 SHYDER, Edward D., Capt., USA  
 SHYDER, Jackson V., Capt., USA  
 SIEBEL, Melvin, Capt., USA  
 SPANKUS, Jack D., Capt., USAF  
 STARK, William A., Capt., USA  
 STEIN, Myron L., Capt., USA  
 STEINMAN, Arnold M., Capt., USA  
 STEIN, George E., Capt., USA  
 STELL, Howard L., Jr., Capt., USA  
 STOUT, Robert F., Capt., USA  
 STUNDERLAND, William M., Jr., Capt., USAF  
 STURON, Jack, Capt., USA  
 STUTZMAN, Paul V., Capt., USA  
 TALEOT, Blake C., Capt., USN  
 TAYLOR, Edward W., Jr., Capt., USA  
 TAYLOR, James P., Capt., USA  
 TAYLOR, Thomas L., Capt., USA  
 TIBBON, Louis F., Capt., USN  
 TIERNEY, Peter C., Capt., USA  
 TIERRELL, Thomas F., Capt., USA  
 TIERNEY, James K., M.D., USA  
 THOMPSON, Hugh S., Jr., Capt., USA  
 THOMPSON, J. M., Jr., Capt., USA  
 THOMPSON, Samuel W., Capt., USN  
 THREHILL, Ernest C., Capt., USA  
 TIGRO-MAZARIO, P. A., Capt., USA  
 TORRES, Martin A., Capt., USA  
 TOWNSEND, Jack H., Capt., USA  
 TRENTAN, Michael P., Capt., USA  
 TRONA, Carl J., Capt., USA  
 TUBBIN, Ira H., Capt., USA  
 TUCKER, Vernon D., Capt., USN  
 TURNER, William P., Capt., USN  
 UDEY, David C., Capt., USA  
 UTT, Theodore P., Capt., USA  
 Van DerKOUDE, H., Capt., USA  
 VARGAS, Rivera A., Capt., USA  
 VERC, John Y., Capt., USA  
 VEST, Leonard A., Capt., USA  
 VERGILIO, Frank D., Capt., USN  
 VOGEL, Joseph, Capt., USN  
 VOGT, Gordon J., Capt., USA  
 WADLER, Marvin, Capt., USA  
 WAGMAN, Albert D., Capt., USA  
 WALLYN, Richard J., Capt., USA  
 WALTERS, Correllus, Capt., USA  
 WATKINS, Franklin P., Capt., USA  
 WATERS, George S., Capt., USN  
 WEATHERS, William G., Capt., USA  
 WEBBTRAP, Ronald A., Capt., USA  
 WELLS, Charles G., Capt., USA  
 WHARTON, James D., Capt., USN  
 WHITE, William A., Capt., USAF  
 WIENER, Joseph, Capt., USA  
 WILHELM, Rudolf E., Capt., USA  
 WILLIAMS, David M., Capt., USAF  
 WILSON, Robert M., Capt., USA  
 WITT, Frederick V., Capt., USAF  
 WOODINGTON, G. F., Capt., USA  
 VOLVERTON, William P., Capt., USA  
 WONG, Yip How, Capt., USA  
 WRIGHT, Gene E., Capt., USA  
 WULFMAN, William A., Capt., USN  
 WURZBACHER, Warren, Capt., USA

# MEDICAL CORPS--Continued

WITTEL, Edward M., Capt., USA  
YABINI, Bernard A., Capt., USA  
YITMAR, Frederick, Capt., USA

YERNE, Stanley R. M., Capt., USA  
ZOLL, Daniel R., Capt., USA  
ZUPPERRY, S. A., Capt., USA

## DENTAL CORPS

ALBRIGHT, Ronald L., Capt., USA  
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BERNEY, John R., Capt., USA  
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BOGGEREN, Paul P., Capt., USA  
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BOYLAND, Colonel J., Capt., USA  
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COCK, Wayne, Capt., USA  
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DEATHERAGE, Lewis A., Capt., USA  
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DUTTON, Larry H., Capt., USA  
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HMER, John F. O., Capt., USA  
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MADDOCK, Belman C., Capt., USA  
MARENGO, Carlo L., Capt., USA  
MARTIN, G. Bert G., Capt., USA  
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MICHARD, Carl A., Capt., USA  
OOP, John R., Capt., USA  
PARALEX, Claude A., Capt., USA  
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STROUT, Jacob C., Capt., USA  
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VEIN, John A., Capt., USA  
WAGNER, Alvin G., Capt., USA  
WAGNER, Thomas E., Capt., USA  
WARREN, William L., Capt., USA  
WENT, George A., Jr., Capt., USA  
WHITE, Charles P., Capt., USA  
WHITE, Marcell T., Jr., Capt., USA  
WHEATLY, Frank T., Jr., Capt., USA  
WILLIAMS, Thomas D., Capt., USA  
WILLIFORD, William, Capt., USA  
WOTKRELL, Leroy A., Capt., USA  
WOLEN, Irving, Capt., USA

## MEDICAL SERVICE CORPS

ALLEN, Charles H., Capt., USAF  
BEALE, Charles C., Capt., USAF  
BEATTY, Maxine, Capt., USAF  
BRADEN, Robert A., Capt., USAF  
CLAY, John L., Capt., USAF  
DILLS, Gerald C., Capt., USAF  
DUNKERTON, Ethel A., Capt., USAF  
FOEED, Robert C., Capt., USAF  
GIBB, Clinton R., Capt., USAF  
GRIFFIN, Robert W., Capt., USAF  
GRILLQ, Gino P., Capt., USAF  
HAGEN, Harold A., Capt., USAF

FENTON, Alan J., Capt., USAF  
JACOBSON, Robert T., Capt., USAF  
JONES, Bruce, Capt., USAF  
KEEFE, Lewis J., Capt., USAF  
KIMBLE, Arlene, Capt., USAF  
LITVINSKY, James D., Capt., USAF  
PACOR, John E., Capt., USAF  
POLEY, George W., Capt., USAF  
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VAN CAY, Kenneth F., Capt., USAF  
WEST, Billy, Capt., USAF  
WILSON, Robert R., Capt., USAF

## NURSE CORPS

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BELT, Virginia T., Capt., USAF  
BELLINGHAM, Jane D., Capt., USAF  
BOLDEN, Inna, Capt., USAF  
CAPLSON, Mary S., Capt., USAF  
CLEMETSCH, Alvina L., Capt., USAF  
COMER, Ross L., 1st Lt., USAF  
FLATTERY, Gladys A., Capt., USAF  
FRANZOS, Anna M., Capt., USAF  
GACUSE, Julia, 1st Lt., USAF  
HALEY, Lorraine M., 1st Lt., USAF  
HAMMOND, Patricia A., 1st Lt., USAF  
HEALY, Mary E., Capt., USAF  
HENDERSON, Gertrude H., Capt., USAF  
HERRICK, Helen L., Capt., USAF  
JACKSON, Doris M., Capt., USAF  
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McMAYON, Mary A., Capt., USAF  
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MUGLIA, Margaret P., Capt., USAF  
NIXON, Eva C., Capt., USAF  
PARRISH, Lillian H., Capt., USAF  
PETRUSCH, Nora J., Capt., USAF  
POLLEY, Fern E., Capt., USAF  
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SEWERTH, Dolores L. S., Capt., USAF  
SIMMONS, Olivia F., Capt., USAF  
SNAYLEY, Joyce M., Capt., USAF  
SPACKMAN, Helen J., Capt., USAF  
SPINELLI, Marie T., Capt., USAF  
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THOMAS, Lorna R., Capt., USAF  
THOMPSON, Patsy M., Capt., USAF  
WEAVER, Phyllis J., Capt., USAF

# ANNUAL MEETING OF MILITARY SURGEONS IN WASHINGTON, D. C., NOVEMBER 12-14

The expanding horizons of military medicine will be the theme of the 63d annual convention of the Association of Military Surgeons of the United States which will be held at the Statler Hotel, Washington, D. C., from 12-14 November 1956. In addition to the program listed below, a record number of 14 technical and scientific exhibits have been planned for display throughout the meeting.

## Monday Morning, 12 November

**Presiding:** Rear Adm. Winfred P. Dana, MC, USN, President

**Association President's Address**—Rear Adm. Winfred P. Dana, MC, USN, Assistant Chief for Aviation and Operational Medicine and Research and Medical Military Specialties, Bureau of Medicine and Surgery, Department of the Navy.

**Welcoming Remarks**—Edward H. Cushing, M. D., Deputy Assistant Secretary of Defense (Health and Medical).

**Guest Speaker**—Detlev W. Bronk, Ph. D., President, National Academy of Sciences.

**Expanding Horizons: Career Incentives**—Rear Adm. Bruce E. Bradley, MC, USN, Acting Surgeon General, Department of the Navy.

**Medicare Law**—Maj. Gen. Silas B. Hays, MC, USA, Surgeon General, Department of the Army.

**Expanding Horizons of Aviation Medicine**—Maj. Gen. Dan C. Ogle, USAF (MC), Surgeon General, Department of the Air Force.

**Expanding Horizons: Teamwork in Civilian and Military Health Services**—Leroy E. Burney, M. D., Surgeon General, U. S. Public Health Service, Department of Health, Education, and Welfare.

**Expanding Horizons in Research and Education in the Veterans Administration**—Roy A. Wolford, M. D., Deputy Chief Medical Director, Veterans Administration.

## Monday Afternoon

**Presiding:** Winchell McK. Craig, Rear Adm., MC, USNR (Ret.), Section of Neurological Surgery, Mayo Clinic, Rochester, Minn.

**Hormone-Producing Tumors**—Roy Hertz, M. D., Chief, Endocrinology Branch, National Cancer Institute, National Institutes of Health.

**Replacement Arthroplasty in Military Patients**—Lt. Col. Earl W. Brannon, USAF (MC), 3700th U. S. Air Force Hospital, Lackland Air Force Base.

**Preliminary Studies on Bovine Embryo Skin Grafts**—Lt. A. N. Silvetti, MC, USNR, Naval Medical Research Institute, National Naval Medical Center, and Blair O. Rogers, M. D., Clinical Instructor in Plastic Surgery, New York University College of Medicine.

*Experiences with the Adenovirus Vaccines in Navy Recruits* (Co-operative studies of the U. S. Navy, the University of Chicago, and the U. S. Public Health Service)—Joseph A. Bell, M. D., Chief, Epidemiology Section, Laboratory of Infectious Diseases, National Institute of Allergy and Infectious Diseases, National Institutes of Health.

### Tuesday Morning, 13 November

**Presiding:** Brig. Gen. Stanhope Bayne-Jones, MC, USAR (Ret.), Formerly Technical Director of Research, Office of the Surgeon General, Department of the Army.

*Significance of Leptospirosis in Military Medicine*—Lt. Col. Leslie C. Murphy, VC, USA, Deputy Director, Division of Veterinary Medicine, Walter Reed Army Institute of Research.

*Rapid Extracorporeal Oxygenation of Banked Blood*—Capt. William G. Malette, USAF (MC), Resident Surgeon, Denver Veterans Administration Hospital; William B. Summers, M. D., Denver Veterans Administration Hospital; and Ben Eiseman, M. D., Chief of Surgical Service, Denver Veterans Administration Hospital, and Associate Professor of Surgery, University of Colorado School of Medicine.

*Military Operations in Radiologically Contaminated Areas*—Lt. Col. James B. Hattgering, MC, USA, Director, Division of Physiology and Pharmacology, Walter Reed Army Institute of Research.

*Anorganic Bone Chemistry, Anatomy and Biological Reaction*—Comdt. Fred L. Losee, DC, USN, Naval Medical Research Institute, National Naval Medical Center, and Lloyd A. Hurley, M. D., Harlan Memorial Hospital, Harlan, Ky.

*Late X-Ray Evidence of Spontaneous Reduction of Dislocation of Cervical Intervertebral Discs*—Benjamin H. Kesett, Col., USAR, Consultant in Neurology, Veterans Administration Hospital, Hines, Ill.; Associate, Department of Neurology and Psychiatry, Northwestern University Medical School.

*X-Ray Cineradiography and Portable X-Ray Units*—Adolph T. Krebs, M. D., Head, Radiobiology Department, Army Medical Research Laboratory, Fort Knox, Ky.

### Tuesday Afternoon

**Presiding:** Col. Victor A. Byrnes, USAF (MC), Director of Professional Services, Office of the Surgeon General, Department of the Air Force.

*Preservation of Whole Blood by Freezing*—Harold F. Meryman, M. D., Department of Internal Medicine, Yale Medical School.

*Cold Weather Survival*—Maj. Stanley Lutz, Jr., USAF (MC), Assistant Surgeon, Headquarters, 18th Air Force, Donaldson Air Force Base.

*Atherosclerosis and Lipid Metabolism*—Daniel Steinberg, M. D., Chief, Section on Metabolism, National Heart Institute, National Institutes of Health.

*Results of Early Studies on Effects of Sleep Deprivation*—David McK. Rioch, M. D., Director, Division of Neuropsychiatry, Walter Reed Army Institute of Research.

*A Hearing Evaluation of an Air Force Squadron of Jet Aircraft Maintenance Personnel*—Capt. R. G. Hansen, USAF (MSC), Wright Air Development Center, Wright-Patterson Air Force Base.

## Wednesday Morning, 14 November

Presiding: William S. Middleton, M. D., Chief Medical Director, Veterans Administration.

*Neurological Complications of Spinal Anesthesia*—Myron J. Levin, M. D., Clinical Professor of Anesthesia, University of Illinois College of Medicine, Chicago, Ill.; Assistant Chief, Anesthesia Section, Veterans Administration Hospital, Illinois, Ill.

*Radiation Control Problems Aboard Nuclear Submarines*—Lt. Comdr. John H. Ebersole, MC, USN, Medical Officer, U. S. S. *Seawolf* (SSN 575).

*Clotting Factor Abnormalities in Chronic Liver Disease*—Joseph R. Goodman, Ph. D., Head, Physiological Research Unit, Medical Research Program, Veterans Administration Hospital, Long Beach, Calif.; Research Associate, Department of Biochemistry and Nutrition, University of Southern California Medical School, Los Angeles, Calif.

*The Wholesomeness of Irradiated Food and Its Military Implications*—Col. Tyron E. Huber, MC, USA, Research and Development Division, Office of the Surgeon General, Department of the Army.

*Practical Application of Pulmonary Physiology for Small Hospitals*—Maj. Robert B. Stonehill, USAF (MC), Chief of Pulmonary Disease Section, Lackland Air Force Hospital.

## Wednesday Afternoon

Presiding: David E. Price, M. D., Assistant Surgeon General, U. S. Public Health Service, Department of Health, Education, and Welfare.

*Future Trends in Military Aviation Medicine*—Capt. Ashton Graybiel, MC, USN, Director of Research, School of Aviation Medicine, Naval Air Station, Pensacola, Fla.

*Experiences in Evacuation of Severely Burned Patients*—Lt. Col. Robert D. Pillsbury, MC, USA, Deputy Commander, Surgical Research Unit, Brooke Army Medical Center.

*The Effect of Thyroid Ablation Upon Serum Cholesterol and  $\beta$ -Lipoprotein Spectrum*—Joseph R. Goodman, Ph. D., Head, Physiological Research Unit, Investigative Medicine Service, Veterans Administration Hospital, Long Beach, Calif.; Research Associate in Biochemistry, University of California Medical School, Los Angeles, Calif.

*Nurse Anesthetist Refresher Course*—Capt. Richard J. Ward, USAF (MC), 7100th U. S. Air Force Hospital, Wiesbaden, Germany.

*Medical Education for National Defense*—Col. Sheldon S. Brownston, USAF (MC), Director of Staff, Office of Secretary of Defense (Health and Medical).

*The Tranquilizing Drugs*—Edward V. Evarts, M. D., Acting Chief, Laboratory of Clinical Sciences, National Institute of Mental Health, National Institutes of Health.

*Effects of Microwaves: Current and Proposed Research*—Maj. Daniel B. Williams, USAF (MC), School of Aviation Medicine, U. S. Air Force, Randolph Air Force Base.

## Reviews of Recent Books

**BLAKISTON'S NEW GOULD MEDICAL DICTIONARY**, A modern comprehensive dictionary of the terms used in all branches of medicine and allied sciences, including medical physics and chemistry, dentistry, pharmacy, nursing, veterinary medicine, zoology and botany, as well as medicolegal terms, edited by *Normand L. Hoerr, M. D.*, and *Arthur Osol, Ph. D.*, with the cooperation of an editorial board and 88 contributors. 2d edition. 1,463 pages; 252 illustrations on 45 plates, 129 in color. The Blakiston Division, McGraw-Hill Book Co., Inc., New York, N. Y., 1956. Price \$11.50.

Here is the dictionary that medical writers and editors have been waiting for. Compiled by a distinguished editorial board and 88 eminent and authoritative contributors in specialized fields, this completely revised and enlarged new edition has kept pace with our ever-growing, rapidly changing, current medical and surgical language. Thousands of new entries (some 12,000), changes (8,000), and modernization of spellings and usage are incorporated; and obsolete and unused terms have been deleted. Recognition of usage was a determining factor in selection. With the exception of the tables on diet and veterinary doses, the same helpful tables and lists, some revised, comprise the appendix; the color plates and halftone illustrations remain as in the first edition. A new table on radioactive and other isotopes commonly used in medicine has been added.

Definitions are concise, clear, accurate. Pronunciation is simplified by syllable division and accent and, when necessary, by phonetic respelling. A convenient key to the respellings acts as a helpful, easy guide.

Rapid finding of any term is facilitated by clear italic, roman, and boldface type. When series of subentries follow main entries they have been set in indented columnar form and each item set off in boldface type.

Altogether, the practitioner, student, medical author and editor, and all others concerned with medicine and the allied fields will appreciate this practical, helpful, and discriminating work.—E. W. MARTIN

**CLINICAL LABORATORY DIAGNOSIS**, by *Samuel A. Levinson, M. S., M. D., Ph. D.*, and *Robert P. MacFate, Ch. E., M. S., Ph. D.* 5th edition. 1,246 pages; 244 illustrations and 13 plates, 11 in color. Lea & Febiger, Philadelphia, Pa., 1956. Price \$12.50.

Five years have elapsed since the last edition of this standard and highly regarded text in clinical pathology. It has been revised, enlarged by 100 pages, and brought up to date. However, the number and titles of the chapters are identical with the previous edition.

The entire chapter on hematology has been revised to include current knowledge of hemorrhagic diseases, anemias, and leukemias. Newer knowledge concerning hemoglobin components along with the use of paper electrophoresis in the analysis of these components is presented. The entire section on hematology is particularly well done. The section on chemistry includes new microchemical methods, additional spectrophotometric analyses, and the spectrum analysis of hemoglobin derivatives, as well as a new discussion on electrolyte balance studies. There is an adequate discussion of blood groups, Rh factor, and the Coombs' test, but the section on blood bank procedures is very brief for this extremely important phase of laboratory work. The reader is referred to the standard texts and reference manuals for details of these procedures. The methods for the performance of the Venereal Disease Research Laboratory slide and tube flocculation tests are included in the chapter on immunology and serology. There is even a brief discussion of the *Treponema pallidum* immobilization test. The chapter on bacteriology has been rewritten with the addition of the method for the determination of the antistreptolysin titer of sera and other new techniques. Modifications and improvements have been made in the chapters on tropical diseases and histologic technique. The section on legal medicine and toxicology is an excellent review or introduction to this special field. There is an adequate index as well as a table referring the reader to the proper page for important laboratory tests in the common diseases.

The authors have attempted to bring together in a single volume all the many phases of clinical pathology. They have achieved this objective in discussing the most useful methods of laboratory medicine in a systematic, concise manner. The book is well printed with numerous excellent illustrations. It is highly recommended to the medical student, medical technologist, practicing physician, and pathologist as an authoritative text in clinical laboratory methods.

—MILWARD W. BAYLISS, Col., MC, USA

DISEASES OF THE SKIN, by Richard L. Sutton, Jr., A. M., M. D., F. R. S. (Edin.). 11th edition. 1,479 pages; 1,972 illustrations. The C. V. Mosby Co., St. Louis, Mo., 1956. Price \$29.50.

The 11th edition of this standard textbook of dermatology is a worthy successor to the previous editions. During the 13 years since this book was last reprinted and emended, many advances have been made in the specialty, and the author has successfully noted and included in this work these additions. The author has been peculiarly successful in adding to the book hundreds of photographs, many more pertinent subjects and improved discussions. This edition is written more as an outline than previous ones, some subjects having been cut considerably, yet have been treated more precisely and informatively than before. The photographs are superb. The author has added the more recent therapeutic advances in pertinent portions of his text. ACTH, cortisone, and hydrocortisone are discussed, and their uses outlined. There



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—MILWARD W. DAYLISS, Col., MC, USA

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diagnostic, and therapeutic aspects of diseases of the skin. It is a brief, practical, and useful text for the student and practitioner.

The book is well illustrated with both black and white and colored plates, and the printing is excellent. Organization of the subject matter is practical and useful. Particularly helpful to the nonspecialist is the section included in each chapter on those aspects of nursing that are particularly germane to the diseases considered.

The chapter on general therapeutic suggestions will prove to be a most helpful guide to the beginner.

Dr. Tobias again has succeeded in presenting a wide and difficult subject in a concise and readable form, yet complete enough for everyday use. This book is highly recommended for students of medicine and the nonspecialist.—VICTOR R. HIRSCHMANN, Col., MC, USA

**WORLD-ATLAS OF EPIDEMIC DISEASES**, Part II, Fourth Issue, edited under the Sponsorship of the Heidelberger Akademie der Wissenschaften by Professor Dr. med. Ernst Rodewaldt, Heidelberg, in Collaboration with Privatdozent Dr. med. habil. Helmut J. Jussatz, Heidelberg. 36 pages; 11 colored maps. Falk-Verlag, Hamburg 1, Germany, 1956. Price 32 Deutsche marks, plus extra charge for postage and packing.

Any attempt, such as this book makes, to portray African diseases in their entirety in so many diversely governed, seminomadic peoples living under such a variety of climatic and social conditions is bound to leave the student with a feeling of uncertainty. However, such comprehensive coverage will certainly serve as a very fine basis for future studies and evaluation of reports from these areas. Plague, leprosy, poliomyelitis, and smallpox are discussed in detail, and the great gaps in information are clearly stated in the text. The maps, as usual with this series, are detailed and contain data oriented as to time and place, but not as clearly as to race. The text clarifies the map presentations, but careful interpretation is required.

In discussing plague, it was noted that the gigantic wave between 1920 and 1930 carried the series of yearly and seasonal waves to a high crest. No explanation for this large wave was attempted, but it may help explain many baffling facts about plague in this and other areas.

Leprosy and its relationship to tuberculosis, diet, poor sanitation, migration, climate, living conditions, and customs are discussed, but no over-all panaceas are proposed. The changing picture of leprosy in Africa since 1900 and the conclusion, attributed to many authorities, that the total incidence is declining may be misleading. This problem is apparently still very great.

There are five fine climatologic maps of Africa that give fairly detailed data on January and July temperatures, total yearly precipitation in the rainy and dry seasons, and a map of thermal suitability values (range of comfort)—all of which are of great value in considering the ecology of disease.—GOTTLIEB L. ORTH, Col., MC, USA

A TEXTBOOK OF OPERATIVE DENTISTRY, by William H. O. McGehee, D. D. S., M. D., F. A. C. D., Harry A. True, D. D. S., F. A. C. D., and E. Frank Inskip, D. D. S., F. A. C. D. 4th edition. 720 pages; illustrated. The Blakiston Division, McGraw-Hill Book Co., Inc., New York, N. Y., 1956. Price \$14.

This is the latest edition of a text that has been standard in its field since 1930. It presents the subject as completely as can be expected in one volume. The first two editions were authored by Doctor McGehee alone, he was joined by the named co-authors for the third edition, and the present edition lists 20 other contributors.

This is a thoroughly modern textbook. Narrative and outline forms of presentation are admirably blended to permit the inclusion of much material without increasing the difficulty of productive study. The 423 figures contain many hundreds of individual illustrations, plus figures from earlier editions. The use of new high-speed materials and technics is presented in a chapter entitled "Accuracy with Speed." In addition to the expected chapters dealing with dental caries, cavity form, cavity preparation, instrumentation, and filling materials, there are chapters discussing such subjects as efficiency in the arrangement of the dental office and the role of the dental assistant in operative dentistry. Endodontics is presented in a separate chapter, and there is a 93-page chapter on operative dentistry for children, authored by Charles A. Sweet, Sr., and I. Irwin Beechen. As in earlier editions, the importance of adequate diagnosis as a requisite to adequate restorative dentistry is stressed.

The material is both well organized and comprehensively treated; subjects are readily discoverable in the index, easily located in the text, and clearly and concisely presented. This volume can be recommended to both students and practicing dentists.

—JAMES E. CHIPPS, Lt. Col., DC, USA

NEW AND NONOFFICIAL REMEDIES 1956, Containing Descriptions of Drugs Evaluated by the Council on Pharmacy and Chemistry of the American Medical Association. An Annual Publication Issued Under the Direction and Supervision of the Council. 540 pages; illustrated. J. B. Lippincott Co., Philadelphia, Pa., 1956. Price \$3.35.

This annual publication of the Council on Pharmacy and Chemistry of the American Medical Association describes drugs, arranged according to their pharmacologic action or clinical use, that have been evaluated by the Council but have not been included in the *Pharmacopeia of the United States*, *The National Formulary*, or, for a prior cumulative 20-year period, in previous *New and Nonofficial Remedies* (NNR). The scope of the book was expanded this year to include not only established useful drugs but also information on all available new drugs. As a result 60 monographs on new drugs were added this year, while only seven from last year's NNR were omitted.

Drugs are described under nonproprietary titles with their chemical or biologic identity, including their actions, uses, side effects, etc.

city, dosage, and routes of administration. Names of commercial preparations are listed after each monograph.

The general index at the end of the book lists the drugs by their commercial as well as their nonproprietary names.

This volume serves the purpose for which published: to give pertinent and reliable information on new and nonofficial remedies and thereby to encourage rational therapy.—PATRICK I. McSHANE, Col., MC, USA

**TEXTBOOK OF MEDICAL PHYSIOLOGY**, by Arthur C. Guyton, M. D. 1,030 pages; illustrated. W. B. Saunders Co., Philadelphia, Pa., 1956. Price \$13.50.

This textbook is written primarily for students and is not a reference work. The author's stated intent is to present the philosophy and logic of the mass of knowledge needed by the physiologist and physician. He has accomplished this goal for the medical student by blending enough anatomy and pathology to stimulate the student's interest in the practical aspects of physiology. However, for the physiology student there is too little emphasis on basic mechanisms and the underlying biophysical principles involved. There is only an occasional use of mathematical models, which in many cases can cleverly and simply define a complicated process.

The book consists of 11 major subdivisions and 75 chapters. The subdivisions follow classical lines, i. e., respiration, neurophysiology, circulation, et cetera. The physiologic aspects of aviation, deep-sea diving, and nuclear radiation are covered in special sections but are very brief. There are several misstatements in a short discussion of the "effects of the atom bomb blast on the body."

At the end of each topic a carefully selected bibliography is included. These references were selected for their own broad bibliographies as well as for their individual value and are exceedingly helpful.

In spite of the above limitations, this is a very readable book which will provide anyone interested in human biology with a readily understandable general review.—JAMES B. HARTGERING, Lt. Col., MC, USA

**YEAR BOOK OF DERMATOLOGY AND SYPHILOLOGY (1955-1956 Series)**, by Rudolf L. Baer, M. D., and Victor H. Witten, M. D. 480 pages; illustrated. The Year Book Publishers, Inc., Chicago, Ill., 1956. Price \$6.50.

This yearbook contains nearly 400 abstracts of articles received by the editors from December 1954 through November 1955. It has the same format and table of contents as previous editions and has an original article by the authors on therapy with superficial x-rays and Grenz rays. Many foreign articles are abstracted. Some abstracts are rather long and could be shortened to make room for summaries of additional articles. The editors emphasize the current studies on cutaneous enzymes and lipid metabolism, and new information is presented on the relationship of skin diseases and systemic involvement.

*Acanthosis nigricans*, *incontinentia pigmenti*, and *acrodermatitis atrophicans* are currently receiving much attention. *Psoriasis*, the ubiquitous enigma, is at long last receiving much therapeutic and biochemical investigation.

The abstracts on therapy are useful. Of interest are those on the use of ACTH, cortisone, and hydrocortisone. Various forms of radiation therapy for dermatoses are presented. The forms of radiation such as high-energy electrons and soft radiation from beryllium window tubes may prove of particular value, being highly effective on skin lesions and having little effect on the underlying tissues.

Dermatology needs a good cumulative index. Until one is produced, however, the yearbooks will provide a good working basis for the researcher as well as a general review source.

—WILLIAM N. NEW, *Capt., MC, USN*

**OF WATER, SALT AND LIFE**, an atlas of 36 pages illustrating 31 color plates, prepared and distributed by Lakeside Laboratories, Inc., Milwaukee, Wis., 1956.

This little book is a beautifully illustrated atlas of fluid and electrolyte balance in health and disease. It consists of 31 colored plates opposite short descriptions of such topics as acid-base balance, pharmacology of diuresis, congestive heart failure, cirrhosis, nephrosis, et cetera. Although some figures require a certain amount of concentration the book does present the feeling of dynamic processes. It should prove to be a valuable aid both to students and to practitioners who may deal with "water, salt, and life."—S. O. WAIFE, *Lt. Comdr., MC, USNR*

**DISEASES OF THE ENDOCRINE GLANDS**, by Louis J. Soffer, M. D., with J. Lester Gabrielove, M. D., and the Section on Gonads by Arthur R. Sobval, M. D. 2d edition. 1,032 pages; 102 illustrations and 3 plates in color; 28 tables. Lea & Febiger, Philadelphia, Pa., 1956. Price \$16.50.

The author discusses the diseases of endocrine glands in separate sections for each gland or, in a few cases, two glands. Reviews of anatomy, embryology, and physiology, which precede the clinical descriptions in each section, contain the details essential for complete understanding of clinically recognizable disease. The chapter on carbohydrate metabolism and diabetes mellitus, included in the first edition, has been excluded from this edition.

Many case reports are advantageously used to amplify the author's descriptions of diseases. The illustrations are clear and adequate, except for a paucity of pictures of patients. Greater use of structural chemical formulas and of tables to bring out similarities of, and differences between, various products of one endocrine gland could add to the value of future editions.

The clarity of presentation makes for easy reading and understanding. The author has, indeed, struck an excellent balance between space allotted to theory and to practice. The endocrinologist interested in the

historical development of our knowledge is unlikely to turn to this book, which is, however, excellently suited to the needs of other physicians.

Because the book is truly up to date in most respects, it was disappointing to read only of the intramuscular corticotropin-eosinophil test for adrenal cortical insufficiency in the section on Addison's disease. Reference is made to Thorn's work, published in 1948. In the appendix, tests using intravenous and intramuscular injection of ACTH are described. However, even there the limitations of the intramuscular injection technic are not discussed.

The appendix (which is devoted to laboratory tests of endocrine function) should be useful to most readers. It could be improved by clarifying the arrangement of order of the tests, perhaps by the use of a preliminary outline or by the use of headings.

In summary, this book can be recommended to general practitioners, internists, and specialists other than endocrinologists as a volume which combines discussions of physiology and disease, theory and practice, and clinical and laboratory aspects in optimum proportions.

—ROBERT J. HOAGLAND, Col., MC, USA

*ADVANCES IN VETERINARY SCIENCE, Volume II, edited by C. A. Brandy and E. L. Jungherr, 449 pages; illustrated. Academic Press, Inc., Publishers, New York, N. Y., 1955. Price \$10.*

This volume continues the approach made in 1953 in Volume I directed toward the periodic review of progress in the more active fields of research pertinent to veterinary medical science. The editors have had the benefit of a distinguished advisory board in the review and editing of the 11 individual contributions comprising the volume.

The subjects discussed are epizootiology of virus diseases, mycoses in animals, respiratory diseases of poultry, the blood groups of animals, disease caused by deficiencies of trace elements, photosensitization in animals, rumen dysfunction, bovine keroses, tickborne rickettsioses in South Africa, vibriosis, and effective control of internal parasites.

Each subject is followed by a bibliography. The value of this work is further enhanced by complete author and subject indexes at the back of the volume.

The reviewer inevitably finds himself more interested in some of the areas concerned than in others. Likewise, the differences in approach by the several contributors are pronounced. These range from almost pedantic undergraduate-level abstracts of the literature to extraordinarily thought-provoking interpretations and estimations of the significance of the newly uncovered findings of veterinary and medical research.

The reviewer has seldom encountered a more fascinating and stimulating paper than the contributions on the epizootiology of virus diseases by R. E. Shope. This alone is sufficient to merit the inclusion

of the volume in the libraries of all interested in infectious disease and in veterinary medicine.

In like manner, the discussion of the blood groups of animals by L. C. Ferguson not only merits careful reading but further serves as a ready reference for valuable technics and methodology.

The editors, the advisory board, and the individual contributors have admirably met their objective of producing a volume "of greatest use to the serious student, the research worker, and the practitioner (of veterinary medicine)." This volume should be required reading for all veterinarians of the armed services.

—WILLIAM S. GOCHENOUR, Jr., Lt. Col., VC, USA

**CAUSAL FACTORS IN CANCER OF THE LUNG**, by Carl V. Weller, M. S., M. D. American Lecture Series, Publication No. 277, A Monograph in American Lectures in Chest Diseases, edited by J. Arthur Myers, M. D., Ph. D. 113 pages; illustrated. Charles C Thomas, Publisher, Springfield, Ill., 1956. Price \$3.

Regardless of the time available, it is the dream of every lecturer to be permitted an additional 15 minutes to devote to his subject. The Charles C Thomas Company has done just this in a number of monographs called the "American Lecture Series." Outstanding authorities have been allowed to revise, expand, and annotate their most popular lectures. These have been published and, despite the variety of subjects and of authors, have generally maintained a very high quality. Strangely, the publishers "do not have a completely up-to-date list of The American Lecture Series." To the reviewer this seems a pity. Those volumes of the series which he has examined in the past have been worth owning.

The present volume is typical of this series. The lecture has been expanded to a monograph, supplemented by 121 carefully and well-chosen references. Following a discussion of general considerations, Dr. Weller develops in detail a first theme describing bronchogenic carcinoma as an endemic occupational disease in miners, a second theme describing the search for causes of cancer of the lung in the 20th century, and a third theme concerned with the relation between tobacco smoking and bronchogenic carcinoma.

Although the subject of the lecture is sharply limited, the material is presented in an interesting and even exciting manner. The author has accomplished his objective, which was to explore the "causes, intrinsic and extrinsic, proved and suspected, of bronchogenic cancer." The type and engravings are of high quality, the binding is leatherette, and the volume is handsome in appearance. It is recommended as a valuable addition in any general library and to physicians and workers with a special interest in this field. For those who may have to lecture on this subject, this monograph would be of considerable value.

—ARTHUR STEER, Lt. Col., MC, USA



**CURRENT THERAPY, 1956, Latest Approved Methods of Treatment for the Practicing Physician**, edited by *Howard F. Conn, M. D.* and 12 consulting editors. 632 pages. W. B. Saunders Co., Philadelphia, Pa., 1956. Price \$11.

This is the eighth edition of this compendium of therapy which fortunately has resisted the expansion in bulk which usually occurs with medical books from edition to edition. The contributors are selected from recognized authorities who are especially interested in the specific disease discussed. They vary with the edition and consequently new viewpoints are given. The outlines of therapy are brief and practical, and treatment methods found useful in the past are not discarded if still effective, although obsolete methods of treatment are omitted.

There is a multitude of new drugs available and those well tried are included; experimental drugs are not included, and note is made when treatment methods not fully tested are given.

At times two different methods of approaching treatment are noted, either of which might be followed successfully or from which the reader might evolve a third of his own, proving that medicine as an art is not yet dead.

This book is a useful desk reference, brief and to the point, which gives the essentials of therapy of each disease and the most up-to-date methods and drugs, and which prevents one's missing some new aspect of treatment.—*JAMES L. TOBIN, Col., USAF (MC)*

**THERAPEUTIC USE OF ARTIFICIAL RADIOISOTOPES**, edited by *Paul F. Hahn, Ph. D.* 414 pages; Illustrated. John Wiley & Sons, Inc., New York, N. Y., 1956. Price \$10.

This 400-page volume represents a compilation of 29 research men's experience in the use of isotopes over a 20-year period. The editor's choice of authors seems for the most part to reflect his philosophy of being more forthright and willing to take some scientific risks in incurable patients in order to more fully understand the capabilities of these medical tools. He feels irradiation is a therapeutic weapon and is not the panacea to the cancer problem. He proceeds to show the results of thorough scientific research in an inspiring and challenging way.

The order of presentation of chapters is excellent. Prefacing the individual uses of isotopes is a section including a short history of the use of radioisotopes, the problems facing even the most astute scientist in using them, their procurement and safe handling, and their effects on tissue. Within these first chapters is an effective blending of doctors of medicine and doctors of other scientific fields. Chapters 2 and 3 might be disconcerting to the novice in this field, and possibly keep him from finishing the book. Yet the subjects of radiologic physics and dosimetry of internal radioisotopes are concisely presented, and by carefully studying these chapters a wide knowledge can be gained in a short time. The procurement of isotopes has been brought

up to date with the addendum to chapter 4. The work by Hymer f., Friedell and P. R. Saletno as reviewed in chapter 6 presents a challenge to all those working in this broad field. Radiation effect is little enough understood, let alone the effect of multiple types of radiation. These men outline methods of research into the synergistic effect of isotopes used in combination that would be well used by others in studying this most urgent problem. Edwin E. Osgood's chapter on the treatment of leukemias and polycythemia vera with radioactive phosphorus is a splendid review of a method of treating the complete patient. The basic histophysiology upon which this treatment is based has been well investigated by the author, and the complete way in which he outlines his course of therapy is excellent. The work by Osgood, Tivey Seaman, et al. is classical. The next chapter also deals with investigative methods for treatment of chronic leukemias, presenting case histories to highlight questions as to mode of action of radiation, problems faced during treatment, and choice of isotopes in treating this disease state.

Chapter 9 is an excellent review of the use of radioiodine in thyrotoxicosis and a brief note on its use in cardiac disease. Chapter 10, on treatment of thyroid carcinoma, is on clinical selection of patients, methods of use of iodine, dosimetry of radiation within the body, complications, a summary of what the author thinks is reasonable management of treatment, and safeguards for the patients and personnel.

The next seven chapters deal with specific colloids, applicators, and implants of isotopes within or on the body in attempts to ablate or palliate cancerous tumors. These chapters have been written by specialists in each field and represent the most advanced knowledge on these subjects. The last chapter, written by G. H. Fletcher, is a concise summary of this man's thought on the advantages and disadvantages of this method of treatment. The book is invaluable to specialist and general practitioner as a guide and review of what has been done in this field.—*RICHARD E. OGBORN, Maj., MC, USA*

THE MEDICAL DEPARTMENT OF THE UNITED STATES ARMY. Surgery in World War II. Hand Surgery, edited by Sterling Bunnell, M. D. 447 pages; illustrated. Prepared in the Historical Unit, Army Medical Service, under the direction of Colonel Calvin H. Goddard, MC, AUS. Editor-in-Chief, Colonel John Boyd Coates, Jr., MC, USA; Associate Editor for Hand Surgery, Mary E. McDonald; Assistant Editor, Janie W. Williams. Office of the Surgeon General, Department of the Army, Washington, D. C., 1955. For sale by the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C. Price \$3.50.

This volume is both a historical document and a report of a clinically important collective experience in the management of the injured hand. Although the format of résumés of experiences in the individual theaters of operation and hand centers results in considerable repetition, the basic principles of hand surgery are so unanimously and emphatically emphasized that their importance cannot be missed.

The book is well illustrated with photographs, sketches, and photographic copies of roentgenograms which are usually well placed to conform with the text. Many of the illustrations, however, are so reduced in size that their value is lost—this is particularly true of the roentgenograms.

The influence of the editor, as one of the pioneers in the field of hand surgery and as Civilian Consultant for Hand Surgery to the Secretary of War, is felt throughout the book. Chapter 2—consisting of his conclusions based on his experiences as consultant—is a highly concentrated digest of the principles and details of management of the injured hand, but as such might better have been placed at the end so that he could have commented on some of the differences in approach or viewpoint of the various contributors.

Many important lessons can be learned from this book. It is apparent that hand surgery is an important part of any mass casualty situation and that proper care of the injured hand begins in the field. The need for specialized centers staffed by trained and interested personnel is stressed. This is particularly true in the reconstructive phase of hand surgery.

This book is an important contribution to the field of the surgery of trauma. Based on a wide experience, it is a source of general and specific information on all phases of the management of the injured hand. It should be an invaluable addition to the library of the military and industrial surgeon.—HASKELL M. WERTHEIMER, *Comdr., MC, USN*

**EPITOME of the Pharmacopeia of the United States and the National Formulary with Comments.** Issued under the Direction and Supervision of the Council on Pharmacy and Chemistry of the American Medical Association. 10th edition. 322 pages. J. B. Lippincott Co., Philadelphia, Pa., 1955. Price \$3.

For the benefit of those not familiar with this volume, it is designed to follow the material published in the *Pharmacopeia of the United States* and the *National Formulary*, but to present it in such a form that it will be more valuable to physicians. The two volumes mentioned provide the standards for drugs and drug preparations; however, they also contain much detail that is of value to the pharmacist or drug manufacturer but is of little interest to physicians.

The present edition, of convenient size as to make its ready reference inviting, contains only the essential definitions and descriptions of the drugs listed, with more detail as to the nature of the remedies, their uses and doses. Adverse comment is made on preparations believed to be of doubtful value; however, the wisdom of this is questioned in view of the great deliberation which goes into the acceptance of drugs for the official volumes.

The items are arranged alphabetically by their English names, the uses of which are of particular interest to the prescribing physician,

as is the information relative to market preparations in which the drugs may be found.

Some of the words of caution found in the official volumes are omitted from this volume. This point is of little importance in those cases where the "caution" was directed at the manufacturer or the dispenser. However, in those cases where the words of caution were of prime importance to the physician prescribing the medicines, their omission could possibly have a disastrous effect.

The reference tables are a handy aid, and the organization is well planned. The volume should prove to be a valuable adjunct to the physician's desk or library.—ELWOOD M. WRIGHT, Col., MSC, USA

THE MEDICAL DEPARTMENT OF THE UNITED STATES ARMY. *Vascular Surgery in World War II*, edited by Daniel C. Elkin, M. D., and Michael E. DeBakey, M. D. 465 pages; illustrated. Prepared in the Historical Unit, Army Medical Service, under the direction of Colonel Calvin H. Goddard, MC, AUS. Editor-in-Chief, Colonel John Boyd Coates, Jr., MC, USA. Office of the Surgeon General, Department of the Army, Washington, D. C., 1955. For sale by the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C. Price \$4.25.

This volume of the medical history of World War II gives a detailed accounting of complications of traumatic vascular injuries in casualties evacuated to the zone of incision. In this book is statistically recorded what is probably the largest and certainly the most recent and most complete series of vascular injuries to date. Although primarily of historical and statistical nature, the authors have included diagnostic methods, various tests, surgical approaches and techniques as well as valuable pre- and post-operative physiologic data.

The authors tabulate the expected incidence of gangrene which may follow ligation of major vessels. In doing so, Makins' World War I figures on the subject are clarified as is misleading information in the 1943 Military Surgical Manual relative to the expected incidence of gangrene following ligation.

Care of the patient with traumatic aneurysms and arteriovenous fistulas is fully discussed. Additional space is allotted to the systemic effects of arteriovenous fistulas. Statistical data is presented on the results of obliterative operations for these lesions and the value of reparative surgical intervention is stressed. Along with the discussion on surgery is the consideration for sympathectomy. In addition to this excellent study of traumatic aneurysms and arteriovenous fistulas, the incidence, diagnosis, and treatment of patients in World War II with other peripheral vascular disturbances and vasospastic disorders are presented.

Although most of the material in this volume was published in various medical journals prior to this compilation, it is regrettable that this volume was not available for reference at the beginning of the Korean conflict. While this volume is regarded as particularly valuable for

those doing vascular surgery and especially those in the service during hostilities, it is extremely valuable for the use of all general surgeons who may have occasion to treat the complications of acute vascular injuries.—CARL W. HUGHES, Lt. Col., MC, USA

**MIGRAINE AND PERIODIC HEADACHE**, A Modern Approach to Successful Treatment, by Nevil Leyton, M. A. (Cantab.). 2d edition, reprinted. 122 pages. Published by William Heinemann Medical Books, Ltd., London, England, 1954. Distributed by Charles C Thomas, Publisher, Springfield, Ill. Price \$2.50.

This small, 122-page textbook on headache is as fascinating to the reader as a work of fiction. However, it encompasses the leading scientific theories on etiologic mechanisms of headache and includes some concepts new to this reviewer. Detailed points in the history and physical examination are listed on the differential diagnosis. In addition, a relatively simple method of tackling the migraine problem is presented. This is long-term treatment with the aim of preventing headaches, lengthening the interval between them, or ameliorating the attacks. In fact, the most commonly prescribed relief remedies are barely mentioned.

The author is certain that there are two factors present in the production of migraine: first, an organic diathesis which enables a second, sensitizing factor to produce the alteration of arterial calibre that causes the intractable pain. A "trigger mechanism" is necessary to set off the sensitizing factor. This latter may be an overproduction of histamine, the cyclic swing of the estrogenic hormones, or the activation by weather, strain, or chronic disease of a neuralgic syndrome. The "trigger" may be psychological upset, worry, or fatigue.

Treatment is individualistic and includes the progressive injections of an anterior-pituitary-like hormone, histamine injections, the oral use of prostigmine in progressive courses, and the parenteral administration of Vitamin B<sub>12</sub> as well as the use of several other less effective drugs.

Nineteen selective case histories are presented and discussed to illustrate various types of headaches and responses to therapy. Economic and social considerations are presented. The book has a summary of conclusions and a good bibliography, and is well indexed. Illustrations consist only of tables and schedules of treatment.

This book is highly recommended to all physicians who see and fret with many patients with headaches. It gives a positive approach toward treatment and an optimistic outlook for doctor and patient alike. I cannot evaluate or corroborate the results of treatment by these methods, as there has been only sufficient time since receiving this book to start a few patients on some of the therapies recommended. If others can give relief to 75 per cent of migraine patients as the author does, or even to a smaller percentage, this book will be a most useful reference in managing these recurring minor tragedies of everyday practice.

—HORACE C. GIBSON, Col., MC, USA

THE MEDICAL DEPARTMENT OF THE UNITED STATES ARMY. *Preventive Medicine in World War II. Volume II: Environmental Hygiene.* 404 pages; illustrated. Prepared in the Historical Unit, Army Medical Service. Editor-in-Chief, Colonel John Boyd Coates, Jr., MC. Editor for Preventive Medicine, Ebbe Curtis Hoff, Ph. D., M. D. Office of the Surgeon General, Department of the Army, Washington, D. C., 1955. For sale by the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C. Price \$3.50.

This volume is one of a series on preventive medicine in the U. S. Army during World War II and records those plans, operations, and activities which modified or controlled the environment for health purposes. The authors have selected from the mass of data available to them those events which highlight the general principles of environmental hygiene and their application under the varying conditions of global warfare. The areas of environmental hygiene covered in this review include: food management, housing, water purification, waste disposal, insect and rodent control, and foreign quarantine. In addition, this volume contains an excellent résumé of the major research developments in preventive medicine during the war, as well as a discussion of the many health problems encountered at the various ports of embarkation.

The result is a concise, well-organized treatise on environmental hygiene as it pertains to a military population during mobilization. It gives the reader a comprehension of the effort, planning, and staffing required of the Medical Department in the successful execution of its mission.

Highly recommended reading for all officers, medical or line, whose present or future responsibilities require a broad knowledge of the means by which military populations are maintained in a state of healthful equilibrium with their environment, it is also recommended for public health officers, graduate students of preventive medicine, civil defense officers, and anyone whose needs require an excellent reference of this type. —HARVEY G. TOUSIGNANT, Lt. Col., USAF (MC)

LAUGHTER AND THE SENSE OF HUMOR, by Edmund Bergler, M. D. 297 pages. Intercontinental Medical Book Corp., New York, N. Y., 1956, in cooperation with Grune & Stratton, Inc., New York, N. Y. Price \$5.

The essence of this entertaining psychoanalytic book is described in the foreword: "The present volume attempts to bring the analytic theory on laughter and wit up to date . . . This book proposes to show that laughter is a necessary and healthy *internal* debunking process and, therefore, a fear-reducing process . . ."

Liberal sprinkled with jokes, bright sayings, and witticisms, the book covers the many theories of humor, and the author presents his own interpretation clearly and forcibly. Although some familiarity with psychiatric concepts (superego, psychic masochism, et cetera) is helpful in appreciating the various points of view expressed, even the non-psychiatrist can find much of interest in this book.

—S. O. WAIFE, Lt. Comdr., MC, USNR

**THORACIC SURGERY FOR PHYSIOTHERAPISTS**, by Gladys M. Storey, B. R. N., F. C. S. P., with a foreword by N. R. Barrett, M. Chir., F. R. C. S. 132 pages; illustrated. J. B. Lippincott Co., Philadelphia, Pa., 1955. Price \$3.

The author of this book provides valuable insights for the student and practicing physical therapist into the conditions which they will encounter and treat in their work. It is a book of basic principles rather than an extensive and detailed study. It offers an understanding of conditions in thoracic surgery which should promote the use of more efficient treatment procedures.

The scope of thoracic surgery has expanded in recent years and now includes the management of many conditions for which, formerly, nothing curative could be attempted. Information on these new techniques and procedures will be found in this book. There is discussion of pulmonary, pleural, cardiac, vascular, pericardial, mediastinal, esophageal, and neurologic conditions.—AGNES P. SNYDER, Lt. Col., AMSC (PT)

**TUMORS OF THE SKIN**, by Herbert Conway, M. S., M. B., M. D., F. A. C. S. A Monograph in The Bannockstone Division of American Lectures in Surgery, edited by Michael E. DeBakey, M. D., and R. Glen Spurling, M. D. Plastic Surgery Division, edited by James Barrett Brown, M. D. 267 pages; 178 figures; 3 plates in color. Charles C Thomas, Publisher, Springfield, Ill., 1956. Price \$13.50.

This monograph is divided into two major sections. The first concerns benign tumors of the skin and the second the malignant tumors of the skin.

Each type of tumor is briefly presented. The discussion is chiefly concerned with clinical characteristics and physical findings, frequency of occurrence, treatment, and follow-up data. Following the discussion of each of the various tumors there is a short bibliography with references as recent as 1954.

Surgical treatment of tumors of the skin is emphasized and there is no attempt made to discuss extensively radiation techniques or other nonsurgical methods of treatment. The book is profusely illustrated with photographs of patients with tumors before and after therapy and with artists' sketches of particular operative techniques. However, the book is not a textbook of surgery. The operative techniques illustrated and discussed are to a large extent detailed to emphasize the application of surgical methods in the removal of skin tumors in locations formerly considered beyond the scope of surgical approach and assigned to nonsurgical methods of therapy.

The arrangement of material in this book and the printing makes it easy to read and to use as a ready reference text. The book should be a valuable addition to the library of interns, residents, and advanced surgeons and should also prove interesting to those in other specialties.

—GEORGE F. PEER, Col., MC, USA

## New Books Received

Books received by the *U. S. Armed Forces Medical Journal* are acknowledged in this department. Those of greatest interest will be reviewed in a later issue.

- POLYSACCHARIDES IN BIOLOGY**, Transactions of the First Conference, April 27, 28, and 29, 1955, Princeton, N. J., edited by *Georg F. Springer*, M. D. 271 pages; illustrated. *Josiah Macy, Jr. Foundation*, New York, N. Y., 1956. Price \$5.
- PROPRIOCEPTIVE NEUROMUSCULAR FACILITATION**, Patterns and Techniques, by *Margaret Knott*, B. S., and *Dorothy E. Voss*, B. Ed. Illustrations by *Helen Drew*. Foreword by *Sedgwick Mead*, M. D. 135 pages; illustrated, *Paul B. Hoeber, Inc.*, Medical Book Dept. of *Harper & Bros.*, New York, N. Y., 1956. Price \$5.50.
- CLINICAL ORTHOPAEDICS**, No. 7, "Tumors of Bone." This number contains a special third section on "Motorist Injuries and Motorist Safety" by *Jacob Kulowski*, M. D. *Anthony F. DePalma*, Editor-in-Chief. 354 pages; illustrated. *J. B. Lippincott Co.*, Philadelphia, Pa., 1956. Price \$7.50.
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# UNITED STATES ARMED FORCES MEDICAL JOURNAL

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## Monthly Message

In the February 1, 1956 number of the *Canadian Medical Association Journal* there is a thoughtful editorial on "The Integration of Medical Research." I should like to quote its first paragraph:

Like Humpty Dumpty, medicine has undergone considerable fragmentation; many are in agreement that the time has come to attempt to put the pieces together again, but, as in the case of Humpty Dumpty, the task is proving extremely difficult. There is a steady movement still continuing towards increasing the subdivision of medical science into sub-specialties; there is also an increasingly strong movement towards a cross-fertilization of one discipline by others. It is as yet impossible to forecast the eventual outcome of these two processes but there is no doubting the grave concern which exists at the ignorance of so many sub-specialists regarding work in other fields.

Unfortunately the splintering of medicine into smaller and smaller subspecialties continues. This may be all very well but I should like to recall the well-known epigram that the expert or specialist is one who knows more and more about less and less. The true specialist is one who considers the patient as a whole in addition to whatever "special" pathological condition he has. Therefore the last sentence in the above paragraph is particularly worthy of consideration.

*Frank B. Berry*

FRANK B. BERRY, M. D.  
Assistant Secretary of Defense  
(Health and Medical)

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(Health and Medical)

# UNITED STATES ARMED FORCES MEDICAL JOURNAL

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## ETIOLOGIC ASPECTS OF ATHEROSCLEROSIS

HORACE C. GIBSON, *Colonel, MC, USA*

**T**HERE is today a vast mass of theory, clinical experience, and investigative data dealing with atherosclerosis. There have been many opposing views, and data have been interpreted differently. I shall try to discuss briefly the more pertinent phases of the problem.

Atherosclerosis is civilized man's greatest killer. Although it has been demonstrated literally from the "cradle to the grave," it takes its greatest toll during middle age—broadly, in men from 40 to 60 years of age and in women from 50 to 70. There is no method of ante-mortem diagnosis before near-total or total occlusion of an artery, usually a coronary. The emphasis in research is on finding some reliable laboratory methods to tell us which individual is imminently prone to a major catastrophe resulting from the rapid development of atherosclerosis. This goal has not been reached, and, what is more disheartening, the development of successful treatment appears to be as slow and as fraught with pitfalls as methods of diagnosis. Advances, however, are being made in both diagnosis and treatment.

The fine work of Gofman and associates<sup>1</sup> on the mechanism of atherosclerosis, presented in 1950, was of such importance that the United States Public Health Service organized a controlled study of the problem. Page<sup>2</sup> describes how four laboratories—Berkeley (Gofman and Jones), Pittsburgh (Laufer, Hennig, and Barach), Boston (Stare and Mann), and Cleveland (Lewis and Page)—were designated, and work started in the winter of 1950. More than a year was required before the centrifuge analyses and cholesterol measurements agreed sufficiently among these labor-

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From U. S. Army Hospital, Fort Jackson, S. C.

## Foreword

The *United States Armed Forces Medical Journal* is the medium for disseminating information of administrative and professional interest to all medical personnel of the Department of Defense. The Assistant Secretary of Defense (Health and Medical) and the Surgeons General of the several services invite all medical officers, dental officers, Medical Service Corps officers, Nurse Corps officers, and officers of the Veterinary Corps of the Armed Forces, and the medical consultants of the Army, Navy, and Air Force to submit manuscripts for publication in this journal.

FRANK B. BERRY, M. D.,  
*Assistant Secretary of Defense (Health and Medical).*

MAJOR GENERAL SILAS B. HAYS,  
*Surgeon General, United States Army.*

REAR ADMIRAL BARTHOLOMEW W. HOGAN,  
*Surgeon General, United States Navy.*

MAJOR GENERAL DAN C. OGLE,  
*Surgeon General, United States Air Force.*

Neither cholesterol nor the other lipids, phospholipid and neutral fat, exist in plasma as pure substances. Lipids are the only large class of vital substances insoluble in water. They are bound to protein in the form of complex lipoprotein molecules. These compounds of lipoproteins contain different proportions of cholesterol, phospholipid, triglycerides, and protein. Electrophoretic or chemical techniques separate them grossly into alpha and beta lipoproteins. Ultracentrifugal analysis results in a classification of high- and low-density lipoproteins of varying  $S_f$ .

The low-density lipoproteins are considered to be the beta lipoproteins of chemical analysis, and abnormally high values of these are found in clinical heart disease. The high-density, smaller lipoproteins are considered to be alpha lipoproteins, although the precise relationship has not been clarified.<sup>2</sup> Lipoproteins serve as important vehicles for lipids, certain vitamins, and probably hormones.<sup>3</sup>

The average laboratory can determine a total serum cholesterol. This is of significant help if done on a fasting specimen. Although this tells us nothing of the low-density or beta lipoprotein levels, there is fair correlation of high cholesterol levels in atherosclerosis, the usual cause of coronary heart disease. The more elaborate methods of study are extremely expensive. The electrically driven analytic ultracentrifuge which uses an optical and photographic system costs about \$18,000. The maintenance costs on it are very great, and its operation requires a full-time technical staff of two persons. Some attempts have been made to get more accurate results in the separation of the lipoprotein fractions by using the differential preparative machine for separating out the various density lipids, and then running phospholipid, cholesterol, and neutral fat determinations on each of these fractions as well as on the whole serum. There is a prodigious amount of work to be done experimentally before any possible short cuts can be developed. The machine in this case costs only \$5,000.<sup>4</sup>

The hyperlipemia of nephrosis as well as of some other diseases is dependent on a metabolic disorder which involves protein as well as lipid. Page suggests that a defect in the synthesis or degradation of the protein moiety of the lipoproteins might be at fault, and that this possible defective protein metabolism may be as important as defective lipid metabolism in atherogenesis.

#### "FILTRATION" THEORY

The arteries are respiring, pulsating musculofibrous tubes. The arterial tissue uses oxygen and nourishment and is supplied by vasa vasorum—numerous small arteries distributed to the outer fibrous and elastic layer (tunica externa) and to the tunica media, the muscular layer. The blood is returned by small venae vasorum from the same layers. The inner layer, or tunica intima,



atories. Next, the serum of 12,000 normal people was studied, and each year since a follow-up has been made to determine whether myocardial infarction or other evident vascular disease has developed. These data are now undergoing statistical treatment in Washington. The first results are expected to be published sometime this year.<sup>1</sup>

In essence, Gofman's working hypothesis of lipoproteia interconversions is that a certain class of lipoproteins, *i. e.*, those with serum flotation ( $S_f$ ) rates between 12 and 20 Svedberg units, are atherogenic. In humans, molecules in the  $S_f$  12-20 class were found to contain about 30 per cent cholesterol and little protein. The quantitative presence of these molecules was statistically related to atherogenesis. Later a second class of molecules was added as significant in atherogenesis, namely, the  $S_f$  20-100, and still later another class,  $S_f$  100-400, less significant in atherogenesis and which may be greatly elevated by a fat meal. Lipid may enter this system in the form of high  $S_f$  lipoproteins, and as these complexes yield their neutral fat to the body depots, high  $S_f$  lipoproteins are successively changed to lower  $S_f$  members of the series.<sup>2</sup> Are these restricted classes of serum lipoproteins, when they are in high quantity in the circulating blood, the ones which signal developing atheroma? As yet there is no clear answer, but the trend among most authorities is toward accepting this concept. However, until the conclusions of the joint laboratory study are known, Gofman's concepts must be considered neither confirmed nor denied.

Goldbloom and associates<sup>3</sup> recently reported on the study of 500 subjects aged 13 to 100 years and found that at the ages of 60 to 75 years the trend toward increase of total lipids, certain serum lipoproteins, the atherogenic index, and the incidence of aortic dilatation is reversed. All these values begin to decline due to some invisible, not-understood barrier. Normal persons thus acquire their "second youth," and this may explain why they attain such ages as 80 to 100 years. On the other hand, perhaps those who do had throughout life a favorable chemical balance of their androgen and estrogen production.

#### NATURE OF INVOLVED LIPIDS AND PROTEINS

Absorption of cholesterol from the intestinal tract is by lymphatics along with fats and the necessary bile. Cholesterol esterified with fatty acids constitutes about 70 per cent of plasma cholesterol and is the more stable form of cholesterol. The liver appears to be necessary for conversion of the free to the ester form. Most tissues, except brain, can synthesize cholesterol, but the liver is most active in this regard, and the evidence points to the control of the plasma cholesterol by the liver.<sup>4</sup>

Neither cholesterol nor the other lipids, phospholipid and neutral fat, exist in plasma as pure substances. Lipids are the only large class of vital substances insoluble in water. They are bound to protein in the form of complex lipoprotein molecules. These compounds of lipoproteins contain different proportions of cholesterol, phospholipid, triglycerides, and protein. Electrophoretic or chemical techniques separate them grossly into alpha and beta lipoproteins. Ultracentrifugal analysis results in a classification of high- and low-density lipoproteins of varying  $S_f$ .

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in arteries of medium size is composed of the endothelial lining, a thin layer of fine areolar tissue fibers and cells called sub-endothelial areolar tissue, and a layer of elastic fibrils running more or less longitudinally, forming an elastic, fenestrated membrane called the elastic lamina.

Apparently the intima has no capillaries running through it. Cleftlike intercellular spaces are present in the intima and media. They may be regarded as the commencement of lymph vessels, but definite lymph vessels are found only in the outer tunic.<sup>7</sup> The "filtration" concept of atherogenesis subscribed to by Page<sup>8</sup> and Martt and Connor<sup>9</sup> and generally accepted is as follows: Lipoprotein molecules filter from the plasma by lateral arterial pressure through the intima and into the media where they are picked up by the capillaries or by the adventitial lymph ducts. Some of these lipoprotein particles get caught in the subendothelial areolar tissue, either because the vessel fails to function properly as a filter or because the size, shape, and charge of the lipoproteins is such as to allow them to stick.

There is clear evidence that subendothelial fibroblastic proliferation, defects in the inner elastic lamella, and changes in the ground substance often are quite as impressive and may even precede the lipid changes of atherosclerosis. Changes in the arrangement, amount, and chemical nature of subendothelial ground substance may alter the filter function. This layer becomes thicker with long stress of hypertension. The nature of the lipid deposited and the responsiveness of the tissue to it will determine whether the lesion remains quiescent or whether a tissue reaction occurs which may cause necrosis and/or initiate a mural thrombus.<sup>2</sup>

Histologists tell us that mural thrombi are common in arteries during middle age and later. Most are asymptomatic, are soon covered by endothelium, and incorporated into the intima, gradually fibrosing and becoming additional layers to the atherosclerotic plaques. Segmental arterial spasm around a fresh thrombus may cause complete closure in an otherwise partially open vessel, hence the very great importance of nitrites in the treatment of early coronary occlusion.<sup>2</sup>

In early atherosclerosis the vessel wall shows a slowly progressive increase in total lipid content, of similar composition to plasma. This continues for some time and supports the view that the source of the vessel wall lipid is plasma lipid. The beta lipoprotein is considered to be the chief carrier of unstably held lipid. As the filtered lipoprotein breaks down, this "lightly bound" lipid is shed within the vessel wall. This lipid, freed from its combination with protein, is now insoluble in water, is foreign,

and is the nidus of a foreign-body reaction. As necrosis occurs, the normal plasma constituents, neutral fat, phospholipid, and free cholesterol decrease, and ester cholesterol increases disproportionately.

The basis of this concept accepts the movement of large amounts of plasma constituents through the vessel walls. To review all the work supporting this theory is not within the scope of this article.

### HYPERTENSION, OTHER ASSOCIATED DISEASES

When Master's criteria<sup>10</sup> are used, 5 per cent of individuals may be expected to have hypertension. Recently Goldstein and associates<sup>11</sup> found that 23.7 per cent of 135 males and 55 per cent of 65 females with coronary occlusion had hypertension. Therefore, hypertension occurred 4.75 times more frequently in their group of males and 11.5 times more frequently in their group of females with coronary occlusion than in otherwise comparable individuals without coronary occlusion. Hypertension is relatively more important in the female. This can be explained on the increased susceptibility of males in the fifth and sixth decades to atherosclerosis with or without hypertension. Premenopausal women are less prone to develop atherosclerosis and coronary occlusion, with or without hypertension. This is presumed to be due to the protective high estrogen production. Contracepted women do not manifest this protection.

The concentration of alpha and beta lipoproteins is normal in early essential hypertension. But, as it becomes severe or malignant, the classes of lipoproteins considered by Gofman and associates to be atherogenic all increase. The development of vascular disease, atherosclerotic, and/or hypertensive, especially if there is renal involvement, seems to be associated with great disturbance in the normal lipoprotein pattern of the blood.

Nephrotic, diabetic, and myxedematous patients also show abnormal lipoprotein patterns. These are examples of accelerated atherogenesis, and do not preclude other more slowly progressive varieties in which there is no detectable change in lipoproteins from what we consider normal.<sup>2</sup>

Idiopathic hyperlipemia is a hereditary condition in which there is a high fasting level of serum neutral fat. The triad of signs and symptoms includes abdominal pain, hepatosplenomegaly, and cutaneous xanthomata. Gofman and associates indicated that these patients have elevations of lipoprotein molecules of the classes S<sub>1</sub> 100-400 which are normally elevated after the ingestion of dietary fat. Clearance tests for orally ingested neutral fat, tagged with radioactive iodine, and vitamin A tolerance tests indicate a striking delay in the clearance of fat from the serum.

The condition is thought to be due to failure of liver and fat depots to remove dietary fat from the blood stream at a normal rate. The cause may, however, be an inherent inability to form adequate amounts of heparin. Restriction of dietary fat, with or without heparin, relieves the symptoms and lowers the plasma lipid much like restriction of carbohydrate, with or without insulin, lowers blood sugar and relieves the symptoms of diabetes mellitus. Hyperlipemic patients are subject to symptoms of coronary insufficiency which are relieved by treatment. Recently Martt and Connor<sup>3</sup> reported the first autopsied case of coronary occlusion occurring in a patient with idiopathic hyperlipemia.

### ENVIRONMENT

Factors of habit and environment as well as inheritance have been blamed as causes of atherosclerosis. I shall dismiss tobacco and alcohol from further discussion as there is insufficient reliable evidence on which to incriminate them in causing atherosclerosis. There is good evidence that tobacco increases established coronary insufficiency, probably by spasm—hence its importance here. And, at the risk of being very unpopular, I must say that reliable work does not bear out the coronary dilating theory of alcohol.<sup>4</sup> Perhaps we can still be comforted by the thought that, used properly, alcohol relieves some of the anxiety and stress of the day and under its mellowing influence we can have our coronary occlusions with less pain and strain.

Exertion within limits is more beneficial than harmful. The active man metabolizes exogenous dietary cholesterol and fats faster than the sedentary man. Men in sedentary occupations are more likely to develop coronary heart disease and, since this is caused by atherosclerosis, physical inactivity may influence its development or progression. The increased rhythmic expansion and contraction of the arteries during exercise may aid the pickup of lipids filtering through the vessel wall by lymph channels.

Occupation appears to influence atherogenesis, I believe indirectly. Perhaps it is that successful businessmen become successful because they have more drive—a preponderance of androgens over estrogens. Or with the mental stress of recurring minor crises, the effect of increased output of corticoids and intermittent elevations of blood pressure may play a part in atherogenesis. Finally, it may be that their living and eating habits result in an increased intake of fats. The increased incidence of atherosclerosis in middle-aged career soldiers is possibly related to the high content of fat in the Army ration.

The influence of fat in the diet has been considered in most countries of the world as an important factor in atherogenesis. The evidence, briefly, is as follows: In Norway during the war years, 1940 to 1945, during a marked curtailment of fat in the

diet, a sharp reduction in the incidence of deaths from coronary, cerebral, and generalized arteriosclerosis was reported. The reduction was approximately 50 per cent. From England a 50 per cent reduction of mortality in diabetics over the age of 45 is reported since the government instituted the rationing of fat at the onset of the last war. Over 100,000 diabetics in England alone have had their lives saved. Similar reports, though less impressive, come from France, Italy, Sweden, Finland, and Denmark.<sup>12</sup> Scattered reports of series of patients treated in this country by a low-fat diet in general favor the reduction of fat along with an over-all lowering of the caloric intake in the treatment of coronary atherosclerosis.<sup>6,12,13</sup> My own experience indicates excess fat intake to be one of the environmental factors which accelerates onset and progression of atherosclerosis. This is still controversial, however. Two recent studies not only present additional data reflecting the adverse influence of fats in the diet of patients with coronary occlusion, but they also lend support to the belief that the low-fat diet results in prolonged lowering of blood lipids. In the study by Roen,<sup>14</sup> 82 per cent of the total initial drop in serum cholesterol was maintained in 50 patients. The period of treatment at the time of the report was from 2½ to 4½ years. Unfortunately, ages were not given. The study from the University of California by Lyon and associates<sup>15</sup> was most complete and gave a follow-up study for a 5-year period of 351 patients with myocardial infarction and 119 patients with angina pectoris. In patients who did not adhere to a low-fat, low-cholesterol diet, the recurrence and death rate was 4 times as high as in patients who adhered to the diet. The low-fat, low-cholesterol diet was found to be effective in maintaining chronically lowered lipoprotein atherogenic index values.

Further information concerning the effect of a prolonged low-fat diet in maintaining a prolonged lowering of plasma cholesterol may be obtained from studies on repatriated American prisoners of the Korean conflict. During "Operation Little Switch" I was one of a group in a position to make certain studies which were published.<sup>16</sup> Serum cholesterol was run on 67 consecutive American prisoners within 24 hours of release by the enemy. The average value was 151 mg per 100 ml, including four with high levels compatible with familial hypercholesterolemia. These four were in the range of 500 to 600 mg per 100 ml. None of the remaining 63 were above 250 mg per 100 ml. Twenty-four had values below 130 mg per 100 ml. These men had been on low-fat, low-caloric diets for two to three years. The mean value of cholesterol done on serum of 25 nonprisoner soldiers at the same time by the same laboratory\* was 219 mg per 100 ml.

\*U. S. Army Tokyo General Laboratory

## HEREDITY

Administration of methyltestosterone has been shown to alter the lipoproteins of serum in that the alpha levels are reduced and the beta levels are elevated. This is thought to be due to the androgenic influence on hepatic function.

Clinical trials of estrogens in males following coronary occlusion have shown increased protection from second occlusions.<sup>14</sup> The gynecomastia, loss of libido, and impotence were deterring complications in the earlier trials. However, trials with smaller dosages of different estrogens reportedly have resulted in minimizing the unfavorable side effects while retaining the protective action. The essence of a great deal of work with the sex hormones is that testosterone increases the beta lipoproteins. Estrogens are efficacious only insofar as they inhibit testicular androgen production, primarily via pituitary gonadotrophic inhibition and secondarily by neutralizing the circulating androgen. They have no effect in the postmenopausal atherosclerotic female, but are helpful in the premenopausal diabetic female in whom hypo-ovarianism is common. After castration, estrogen functions solely as an adrenal androgen depressant.<sup>15</sup>

Eleven relatively young men were currently under treatment for atherosclerotic heart disease in the outpatient facilities of this hospital. Their ages ranged from 32 to 52 years, 5 being under 40. Because of the seriousness of coronary disease in this age group, a trial on estrogen therapy was felt to be justified. A 75-year-old man with carcinoma of the prostate, who had had an orchidectomy, was added for interest. Plasma lipoprotein levels of alpha, beta, S<sub>1</sub> 12-20, and S<sub>1</sub> 20-100 fractions were done at the Walter Reed Army Institute of Research. After the initial determinations, each patient was treated with 0.02 mg of ethinyl estradiol daily for seven weeks. The plasma lipoprotein fractions were again determined, and individual values are shown in table 1. The results were altogether inconclusive. The treatment caused no undesirable symptoms during this period. Estrogen was discontinued. Low-fat, low-cholesterol diets were prescribed for all, and some were started on heparin sodium therapy. After using heparin sodium in a few for familiarization, it is planned to treat most of these men biweekly with 150 to 250 mg of concentrated aqueous heparin sodium subcutaneously for its plasma lipid-clearing action. The laboratory studies will be repeated later at 24- and 48-hour intervals following the previous injection.

Present studies of the cause of atherosclerosis have placed most of the emphasis upon an abnormal elevation of various lipid fractions, the levels of which are affected by patterns of heredity as well as by certain disease states and the increased ingestion of dietary fats. Atherosclerosis, particularly the coronary type, runs in families and represents a mild form of hereditary dis-

turbance of lipid metabolism. Alvord,<sup>11</sup> for instance, found that 15 members of one family had hyperlipemia, 6 had xanthoma tuberosum, and 18 had a history suggesting disease of the coronary arteries. A recent survey<sup>12</sup> of a group of Navajo Indians showed albumin to be lower than normal, and alpha and gamma globulin elevated. Alpha and beta lipoproteins were low, but other lipoproteins were normal. Total cholesterol values were considerably lower than what we consider to be normal. Since diet was the same as that given to the non-Indian control group, heredity appeared to be the most likely explanation for the different values found. The Navajos have a low incidence of coronary disease. Idiopathic hypercholesterolemia may be produced by a single dominant gene. This could determine an individual's capacities and the nature of his reaction under specific conditions. Causative hereditary and environmental factors co-exist and are by no means mutually exclusive.

Men with the body type of prominent muscularity, compactness, and "maleness," the so-called mesomorphic type, are most likely to develop coronary disease at a younger age. Obviously, mesomorphy is hardly a remediable condition, but it is possible that diet and other measures may prevent the early onset of coronary atherosclerosis in this group.

Certain races appear to be prone to atherosclerosis regardless of diet. The Jews are perhaps the best example of this. Do Jewish males produce more testosterone and/or less heparin than, for example, Eskimos, who on a high-fat diet have a low incidence of atherosclerosis? Or is the anatomy, biochemistry, and physiology of the vessel wall, all of which are hereditarily conditioned, different in different races?

Studies of mast cells, which produce heparin, have shown decreased numbers of these cells in atherosclerosis, along with decreased amounts of circulating heparin. A recent report from the Cedars of Lebanon Hospital, Los Angeles, Calif.,<sup>13</sup> may indicate the importance of heparin sodium in the treatment as well as the development of atherosclerosis. One hundred and five patients with known previous myocardial infarctions were given 200 mg of aqueous heparin sodium subcutaneously twice weekly. One hundred and seventeen alternate patients with the same diagnosis and in the same age group were given injections of saline solution. Treatment was given for from 6 to 18 months, and at the end of 2 years there were 21 deaths due to cardiovascular disease in the control group and 4 in the heparin sodium-treated group. Symptomatic improvement occurred in 25 to 35 per cent of the controls and in 50 to 75 per cent of the treated group. These workers found that this dose of heparin sodium significantly lowered the blood level of low-density lipoproteins in these patients for as long as 24 to 36 hours and in some for as long as 72 hours.<sup>13</sup>



TABLE 1. Blood lipid values in 12 patients with coronary heart disease

Clinical data						Lipoproteins (mg/100 ml) before estrogen therapy				After 7 weeks of 0.02 mg ethinyl estradiol daily			
Patient	Age	Diagnosis	Months since onset	Other diseases	Total cholesterol	Alpha lipoproteins (76-142)*	Beta lipoprotein (61-189)	S <sub>f</sub> 12-20 (43-51)	S <sub>f</sub> 20-100 (72-84)	Alpha lipoproteins	Beta lipoproteins	S <sub>f</sub> 12-20	S <sub>f</sub> 20-100
1	36	Infarct, angina pectoris; shoulder-band	18	Hypertension	485	35	268	104	188	97.2	228	112	332
2	37	Infarct	6	Obesity	620	58	254	68	356	58.6	260	34	67
3	41	Angina pectoris followed by infarct	20		405	44	258	47	106	Blood hemolyzed in transit			
4	46	Cardiomegaly, heart disease	3	Myxedema	570	56	280	61	95	36.5	241	34	150
5	42	Infarct followed by angina pectoris	36		460	52	236	38	92	98	263	38	63

TABLE 1. Blood lipid values in 12 patients with coronary heart disease—Continued

Clinical data					Lipoproteins (mg/100 ml) before estrogen therapy					After 7 weeks of 0.02 mg ethinyl estradiol daily			
Patient	Age	Diagnosis	Months since onset	Other diseases	Total cholesterol	Alpha lipoprotein (76-142)	Beta lipoprotein (61-189)	S <sub>f</sub> 12-20 (43-51)	S <sub>f</sub> 20-100 (72-84)	Alpha lipoprotein	Beta lipoprotein	S <sub>f</sub> 12-20	S <sub>f</sub> 20-100
6	50	Infarct	6	Obesity, hypertension	475	47	171	34	64	25.6	162	32	54
7	52	Infarct	36		189	67	145	27	58	73.6	173	71	117
8	39	Infarct	6		537	59	368	189	384	47.1	291	28	47
9	32	Angina pectoris, abnormal ECG	6		405	43	318	65	78	45.6	253	49	145
10	39	Infarct	3	Obesity, diabetes	630	58	313	63	244	29.4	342	76	80
11	49	Infarct (3 times)	60		420	33	254	27	78	54.7	173	34	56
12	79	Orchidectomy (no heart disease)	6	Carcinoma of prostate	207	58	135	38	135	57	225	47	96

\*(): Normal values

—: Abnormal values

In all studies of the infiltration of vascular walls by lipids, time is an important factor. Thus, if the injection of heparin sodium is followed by a marked though temporary reduction of the low density lipoproteins, a transformation from high  $S_1$  to lower  $S_1$  lipoproteins, as reported by several workers,<sup>1,11,20</sup> considerable time may elapse even after the serum lipoproteins have reached their preheparin levels before substantial amounts again penetrate into the arterial walls. Furthermore, macromolecules form films upon the surfaces of the cells and the vascular intima, and, because of their inability to escape through the pores, would be most likely to form fat sludges on the endothelium. Since it is precisely those larger fat particles which almost disappear following an adequate dose of heparin sodium, the harmful effects of intimal films—prevention of normal molecular exchange between the plasma and interstitial fluid, and the accumulation in the subendothelial tissues—should be substantially ameliorated by heparin sodium therapy. Reformation of films should take longer than the reaccumulation of plasma lipoproteins.

Finally, the beta lipoproteins have been found to interfere with glucose uptake in muscle. Their lowered concentration following heparin sodium therapy may permit more normal carbohydrate metabolism in diabetes.<sup>2</sup> This may be vital to heart muscles barely getting enough blood through a narrowed coronary artery.

Heparin sodium may be valuable in preventing platelet agglutination on the cement substance of injured endothelium, which may be the initial step in thrombosis. This is aside from its general anticoagulant action.

Heparin sodium may be used for years with no greater risk of hematoma formation or bleeding than the diabetic's risk from insulin reactions. In fact, insulin dosage should be lowered if heparin sodium is used in a patient taking insulin, since not as much is required.

A great number of investigators favor the use of heparin sodium as an anticoagulant in the prolonged treatment of impending or acute coronary occlusion because of its greater safety, dependability, and the relatively little laboratory control it requires, as well as for its lipid-clearing action.<sup>21-23</sup> This latter may prove to be vital, as ultracentrifugal studies have demonstrated that lipemic clearing is the result of a shift of serum lipoproteins from larger to smaller, less harmful particles.<sup>24</sup> Of more immediate clinical importance, however, is the recent appreciation that alimentary lipemia is associated with increased coagulability of the blood,<sup>25</sup> increased platelet adhesiveness and aggregation of erythrocytes, and an increase in viscosity.<sup>26-28</sup>

## SUMMARY AND CONCLUSIONS

The evidence is fairly conclusive that the circulating lipoproteins are the source of the increased lipids found in atherosclerotic vascular walls. The physical state and particle size of the lipoproteins are important, probably due to the filtration properties of the vessel walls.

Studies of numbers of mast cells in animals and humans, and of circulating heparin levels, indicate that decreased heparin production in the body may be etiologically important in the accumulation of large amounts of circulating low-density serum lipoproteins.

An unfavorable chemical balance of androgen over estrogen often results in increased levels of beta lipoproteins, which appears to be the prerequisite to atherogenesis. Treatment of 12 patients with 0.02 mg of ethinyl estradiol daily for seven weeks failed to produce consistent laboratory improvement.

Factors such as hypertension, diabetes mellitus, nephrosis, myxedema, local factors in the vascular wall, race, and eating habits unfavorably influence atherosclerosis.

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# PSYCHIATRIC PREDICTION AND MILITARY EFFECTIVENESS

## Part II\*

ALBERT J. GLASS, *Colonel, MC, USA*

FRANCIS J. RYAN, *Captain, MSC, USA*

ARDIE LUBIN, *Ph. D.*

C. V. RAMANA

ANTHONY C. TUCKER, *Colonel, MSC, USA*

**T**HE FIRST part of this study demonstrated that when psychiatrists estimated the future effectiveness of recent inductees, their predictions of satisfactory duty were usually correct, but they were unable to efficiently identify the potentially unsatisfactory soldier. However, there still was the possibility that various components of the mental examination may be more accurate indicators of future unsatisfactory service than the over-all impression of the psychiatrist. For example, if it were found that parental disharmony in the formative years or a poor school record was highly correlated with inadequate military duty, psychiatric selection could be made more efficient by properly weighing the positive history of such developmental events. In order to test this assumption, separate elements of the psychiatric examination were compared to military effectiveness.\*\*

## FAMILY HISTORY AND MILITARY PERFORMANCE

A major portion of the psychiatric examination was devoted to circumstances of the early formative environment. Included in this sphere was the psychiatric status of parents and siblings as reported by the subjects. Family members were rated as mentally disturbed if there was a history of psychosis, neurosis, or clear-cut personality disorder. Symptoms of a clear-cut personality disorder included alcoholism, seclusiveness, and anti-social behavior. Table 12 indicates a small but significant relationship between psychiatric abnormalities in siblings and

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unsatisfactory military performance. The influence of mental disturbance in the mother is similar but less striking, although still statistically significant. Psychiatric abnormality of the father was unrelated to military effectiveness.

Another component of the family history concerned the absence of one or both parents because of death, divorce, or severe chronic illness. It is reasonable to believe that inductees from so-called "broken homes" are more apt to become marginal or poor soldiers than individuals who originate from "normal" homes. This hypothesis was tested in table 12 with negative results. Similar inconclusive findings were obtained when the influence of substitute parents upon military performance was explored.

Conflict between parents is usually regarded as deleterious to adequate childhood development. However, table 12 reveals that parental disharmony was not related to military effectiveness. Negative results were also obtained when the influence of overt sibling rivalry upon later duty performance was considered.

The psychiatric examination also recorded the attitude of the subjects toward their parents. Most subjects gave conventional responses of normal positive feelings toward father and mother. The small minority who expressed deviant attitudes of over-attachment, resentment, or ambivalence did not exhibit a significant diminution of military function (table 12).

Economic status of the family during the formative years may play a role in the formation of adult patterns of behavior. Parental economic status was rated as marginal or relief only if difficult financial conditions persisted for two or more years. Table 12 demonstrates that this aspect of family history was statistically related to military effectiveness.

It can be postulated that past or current assimilation difficulties of foreign-born subjects or subjects with foreign-born parents may hinder adjustment to the new military environment. In measuring the effect of cultural differences upon ability to function in the Army, table 12 reveals that this apparent handicap was not a barrier to satisfactory duty.

The influence of religion in the home also was explored for its relationship to military effectiveness. A majority of subjects studied stated that religion was a positive force in the childhood home. The remainder reported religion to be of little or no importance in their formative years. As shown in table 12, this aspect of the early environment did not significantly alter military effectiveness.

The position of the individual in the family constellation in relation to other siblings has been cited as pertinent in the

TABLE 12. Family history and military performance

Criteria	Positive history		Negative history		Statistical significance*
	Number	Per cent satisfactory duty	Number	Per cent satisfactory duty	
Mental abnormality of siblings	48	73	457**	90	.001
Mental abnormality of mother	75	81	430	90	.05
Mental abnormality of father	66	83	439	90	.2
Death, divorce, or chronic illness of parents	148	86	357	90	.5
Substitute mother, father, or both	95	85	410	90	.3
Moderate to marked parental disharmony	126	84	379	91	.1
Overt sibling rivalry	68	84	437**	90	.3
Over-attachment, resentment, or ambivalence toward father	121	86	384	90	.4
Over-attachment, resentment, or ambivalence toward mother	103	83	402	90	.1
Marginal or relief economic status of parents***	223	84	281	93	.01
Assimilation difficulties of subjects or parents	72	83	433	90	.2
Religion of no influence in home	197	87	307	90	.3

\* Above .05 is not considered statistically significant. Chi-square method used in computing levels of statistical significance.

\*\* Includes 52 individuals without siblings.

\*\*\* One case not rated.



development of personality traits such as aggressiveness, dependency, and the like. This question is considered in table 13, and the results indicate that family position had no significance insofar as military performance was concerned.

TABLE 13. *Position in sibling constellation and military performance\**

Position	Number	Per cent satisfactory duty
Youngest, only boy, or only child	230	90
Eldest child or eldest boy	176	88
Middle or other child	99	88

\*Level of statistical significance .5

To recapitulate, this study could establish little or no relationship between environmental circumstances of the past as related by the subjects and their military performance. These rather negative results do not negate commonly held beliefs that early experiences influence later adult behavioral patterns. The results do indicate that retrospective and subjective accounts of the past as given by subjects under conditions of psychiatric evaluation in this or similar studies were not valid indicators of military performance. Moreover, although the death of parents, financial hardship, and position in the family are factual, it apparently is the impact of these events upon the individual that is of more significance for later behavior than is their mere occurrence.

#### PRESERVICE ADJUSTMENT AND MILITARY PERFORMANCE

The second major section of the standardized psychiatric examination dealt with behavior of the subject prior to induction. The first item in this area concerned the individual's adjustment to the family. Adjustment was rated as questionable or impaired if the subject (1) left home before the end of adolescence, (2) quarrelled incessantly with parents or siblings, or (3) was overly dependent upon the family, unable to make independent decisions, or cetera.

Table 14 indicates a small but significant relationship between faulty family adjustment and unsatisfactory military duty.

Another element of preservice behavior involved sexual adjustment. A rating of questionable or impaired adjustment in this sphere was given if there was a history of: (1) repressed sexual drive as manifested by avoidance of the opposite sex, lack of sexual activity, or disgust and overly moral attitudes; (2) exces-

sive preoccupation with sex over an extended period; or (3) persistent overt homosexual desires or activity.

TABLE 14. *Preservice adjustment and military performance*

Area of maladjustment	Satisfactory duty				Statistical significance
	Positive history		Negative history		
	No.	%	No.	%	
Parental family	86	80	419	91	.01
Sex	124	89	381	89	NS*
School	152	80	353	93	.001
Work	71	76	434	91	.001
Social and recreational life	79	80	426	91	.01
Community	36	67	469	91	.001

\*No significance

As demonstrated in table 14, inadequate sexual adjustment was not related to military effectiveness. This finding is not surprising since the sexual drive is usually in a state of flux during early adult life. Thus it was difficult to establish valid criteria of sexual normalcy for the young subjects of this study.

Tangible evidence of achievement and conformity in a structured environment is represented by the school record, which should be a good indicator of future military performance. School adjustment was rated as questionable or impaired if there was a history of (1) consistent failure of the subject to apply himself to his academic task; (2) marked failure to associate with fellow students; or (3) serious disciplinary difficulties with teachers.

As expected, this criterion was significantly correlated with military performance (table 14).

The work record is another objective past accomplishment which involves tasks and obligations similar to that imposed by military service. However, most of the youthful subjects in this study had relatively little time in which to establish patterns of work behavior. A rating of questionable or impaired work adjustment was given if there was (1) floating from job to job; (2) repeated discharges from jobs; (3) chronic difficulties with fellow employees or superiors; or (4) failure to work when opportunities are available.

Based on the above criteria, table 14 reveals that the work record, even in young subjects, was significantly related to military effectiveness.

In assessing social and recreational adjustment, the examining psychiatrists were requested to take into account all interpersonal relationships not centered upon home, work, school, or sex. Impairment in this category was considered present if there was evidence of (1) seclusive, withdrawn behavior; (2) overly aggressive or hostile behavior toward others; or (3) absence of any recreational life.

Table 14 indicates that maladjustment in this area was also statistically correlated with military performance.

The last category of preservice behavior concerned adjustment to the community. A rating of maladjustment was given if there had occurred (1) overt crimes of one kind or another; or (2) trouble-making short of criminal behavior, such as public brawling, obnoxious behavior, when drunk, et cetera.

Table 14 revealed that antisocial behavior was the most significant preservice indicator of unsatisfactory military duty. Because of past and present induction standards which exclude persons who have been convicted of a felony, there were relatively few subjects who were rated as having impaired community adjustment.

It is apparent from table 14 that preservice adjustment is a more efficient predictor of later military performance than the category of family history. Yet it should not be forgotten that the bulk of subjects who were considered maladjusted in any area of preservice behavior did render satisfactory duty. Therefore a positive history of such deviant behavior can only indicate an increased probability of noneffective military functioning rather than a valid reason for psychiatric rejection.

It was not possible to improve the efficiency of prediction by adding two or more criteria of preservice adjustment. The number of subjects who were rated as maladjusted in several areas were too few for accurate statistical analysis. Also little additive benefits were achieved by combining two or more criteria of impaired preservice behavior since the same phenomenon was measured; namely, maladjustment to the preservice environment as represented by school, work, or the community.

#### PSYCHOPATHOLOGY AND MILITARY PERFORMANCE

The standard examination form required the psychiatrist to record his clinical impression regarding the extent of psychopathology that was found, in relation to the following categories:

1. Well integrated.

2. *Neurotic personality*—used to designate neurotic traits or immature reactions which did not disable or incapacitate.

3. Suggestive neurosis—for suggestive psychogenic somatization reactions, immature reactions, or long-standing neurotic symptoms, where there is no clear-cut incapacity or illness.

4. Overt neurosis—where incapacity has resulted from neurotic traits or symptoms.

5. Pathologic personality—includes excessive seclusiveness, anti-social behavior, sexual deviations, and definite pathologic behavior in interpersonal relations with none of the above neurotic patterns.

6. Latent or overt psychosis.

Table 15 indicates that as the severity of psychopathologic symptoms as diagnosed by the psychiatrist increases, military effectiveness decreases. The "well integrated" category, signifying an absence of deviant history or abnormal findings, identifies a superior group in which 90 per cent or more rendered effective service. The performances of those with borderline or mild abnormalities such as "neurotic personality" and "suggestive neurosis" were only somewhat less effective than the average

TABLE 15. *Psychopathology and military performance\**

Category	Number of inductees	Per cent performing satisfactory duty
Well integrated	273	93
Neurotic personality	131	88
Suggestive neurosis	38	84
Pathologic personality	38	81
Overt neurosis	22	68
Latent and overt psychosis	3	0
Total group	505	89

\*Level of statistical significance .001

of the entire group. An interesting result was obtained in the "pathologic personality" group. Although this category includes aggressive, impulsive persons who frequently resort to anti-social behavior and usually have a marginal or poor proservice record, over 80 per cent of those so classified performed useful military service. Although these individuals are often considered to be poor garrison or peacetime soldiers, this finding confirms

the general impression of many psychiatrists that aggressive, unstable personnel often perform creditably under combat and other wartime circumstances. The group judged as having "overt neurosis" had preservice or current disabling neurotic illness. It is noteworthy that two thirds of these subjects rendered satisfactory duty. It is difficult to form firm conclusions from the three individuals who were diagnosed as having latent or overt psychoses. When psychopathologic symptoms are severe and grossly evident, such men should be rejected for military service. However, none of the three subjects were discharged as clinically psychotic. They did exhibit inadequate behavior, and two received administrative types of discharge for unsuitability.

### INTELLIGENCE AND MILITARY PERFORMANCE

Intellectual ability is a traditional measuring device of fitness for both civilian employment and military duty. In order to qualify for military service, selectees must be morally fit, obtain a required score on the Armed Forces Qualification Test (AFQT), and meet proscribed medical standards. The usual rejection rates for each requirement are indicated by the results of preinduction examinations during the first year of the Korean conflict (table 16).

TABLE 16. Results of preinduction examinations under the Selective Service Extension Act of 1950<sup>a</sup>  
(July 1950 through June 1951)

Results of examination	Per cent of inductees
Not acceptable	
For medical reasons only	15.0
Failed AFQT and medical	3.9
Failed AFQT only	15.2
Administrative disqualification*	1.0
Acceptable	64.9

\*Morally unfit, based on previous criminal behavior in most cases.

From the above data, it is clear that failure to pass the AFQT is a major cause of disqualification for military service. Essentially a modified intelligence test battery, the AFQT was introduced in 1950 to meet the needs of the three armed services for a single standard designed to estimate learning potential. Under this standard, individuals could be classified according to their

ability to absorb military training. From the AFQT score, the following groups were devised:

Group	Percentile score
1	93-100
2	65-92
3	31-64
4	10-30
5	0-9

Persons who score in group 5 are generally rejected for military service because they are considered untrainable by the usual methods of military instruction. In practice some selectees who failed to score above group 5 were "administratively" accepted. Those were individuals whose AFQT score was inconsistent with their educational and work attainments or individuals whose motivation for the test was presumed poor.

The material of this study provided an opportunity to assay the usefulness of the AFQT in predicting military performance. Approximately 11 per cent of the subjects scored in group 5 of the AFQT. Those subjects must be regarded as representing a superior level of those who failed the AFQT, since there must have been educational, work achievement, or other factors which influenced induction officials to accept them. It is believed that the performance of group 5 subjects in this study could provide some indication of the potential military usefulness of others who failed the AFQT and were thereby eliminated at induction. The relationship of AFQT results and performance is shown in table 17.

TABLE 17. AFQT results and military performance\*

Group	Number	Per cent giving satisfactory service**
1	47	94
2	98	95
3	150	90
4	148	86
5	58	80

\*Level of statistical significance .001

\*\*Four cases unknown

These results demonstrate a significant positive relationship of the AFQT groupings to military performance, but ability of the AFQT to identify potential unsatisfactory soldiers is questionable since 80 per cent of group 5 subjects rendered adequate duty. In this respect the AFQT did not demonstrate any greater accuracy than several elements of the psychiatric examination.

It is of interest to compare the efficiency of the AFQT with other measures of intellectual capacity. The examining psychiatrists in this study also rated the intelligence of each subject by the clinical impression that was obtained at the interview.

From the results shown in table 18 it is evident that intelligence as judged by the psychiatrist was also significantly related to military effectiveness. However, except for the small number considered to be deficient, clinical estimation of the subjects' intelligence was less efficient than the AFQT.

TABLE 18. *Clinical estimation of intelligence and military performance\**

Category	Number	Per cent giving satisfactory duty
Definitely superior	38	95
Average or above (not superior)	360	91
Below average	95	81
Deficient	12	58

\*Level of statistical significance .001

Another measure of intelligence is educational attainment. Table 19 indicates that low educational attainment (0 to 7th

TABLE 19. *Educational attainment and military performance\**

Educational level completed	Number	Per cent giving satisfactory duty
High school or better (12 or more grades)	295	95
5th to 11th grade	115	84
8th grade	48	83
0 to 7th grade	44	68

\*Level of statistical significance .001

grade) was a better predictor of unsatisfactory performance than the corresponding group 5 of the AFQT. High educational level and AFQT groups 1 and 2 were equally effective in the selection of a superior group who rendered 95 per cent satisfactory duty. However, educational criteria placed 298 subjects in the superior group in contrast to only 145 subjects in groups 1 and 2 of the AFQT score. Scholastic achievement is more than an index of endowed and acquired knowledge, for it is also a valid record of prior adjustment in a disciplined and structured environment. Success in school requires not only intellectual ability but reasonable compliance to authority, some capacity to tolerate frustration, and sufficient maturity to relinquish immediate goals for later and more socially desirable objectives, all of which are similar to requirements for adequate adjustment in a military setting.

### COMMENTS AND CONCLUSIONS

This study tested a major and unresolved question in military psychiatry; namely, can qualified psychiatrists, given a reasonable period of interview time, efficiently predict the future military usefulness of newly inducted draftees or enlistees? Psychiatric selection as such was not directly investigated since the subjects who participated in the project had been medically screened and otherwise found acceptable for military service. Nevertheless, the results of this study are pertinent to the problems of psychiatric selection, for the following reasons: (1) If it is demonstrated that psychiatric impressions are obtained at the inception of military service and are found to have little or no predictive relationship with subsequent performance, these data would constitute strong evidence for doubting the practical value of psychiatric screening. (2) If certain components of the mental examination are found to be more significantly correlated with military effectiveness than the over-all impression of the psychiatrist, the proper use of this information could enhance the reliability of psychiatric selection methods.

The results of this study can be summarized by the following conclusions:

- 1. Psychiatric and psychologic criteria were unable to efficiently identify the potentially unsatisfactory soldier.*

Only 25 per cent of the psychiatrist's predictions of unsatisfactory service proved to be correct, whereas their estimations of satisfactory duty achieved 90 per cent accuracy. Similar results were obtained by training officer prediction, the AFQT score, and several items of the psychiatric examination. This relative inability to properly identify the potential military failure can be ascribed to one or more of the following inherent sources of error in psychiatric prediction.



*Efficient psychiatric screening requires an unusually high degree of accuracy.* As demonstrated in this study and similar investigations, 85 to 90 per cent of military personnel render adequate service. It is necessary to obtain 95 per cent or better correct predictions in order to justify rejection for psychiatric reasons, except in those individuals who are obviously unfit by virtue of gross mental defect or disease. Thus, from a purely statistical standpoint, psychiatric selection faces a formidable task. Only a small minority of candidates can be rejected, and these individuals must have a strong likelihood of noneffective performance, regardless of assignment or other circumstances.

*The element of time markedly influences the accuracy of prediction for unsatisfactory service.* When the future military performance of inductees is estimated for a long duration of time (over 6 months), there is a sharp decrease in the number of correct predictions for below-average and poor duty. This effect of time is clearly illustrated in table 8 (Part 1) of this study, in which 8 of the 9 subjects who were judged to render poor function in the Zone of the Interior are correctly identified. All of these military failures occurred in the initial five months of service, and three subjects were being processed for discharge at the time of the psychiatric examination. In sharp contrast were the results of prediction for overseas and combat assignments which involved subjects who had completed five to six months of training. In these groups, forecasts of unsatisfactory performance were rarely correct (tables 4 through 7, Part 1). It is evident that gross errors in estimating long-term military adjustment are inevitable since a sufficiency of time permits environmental changes and other situational circumstances to exert a profound influence on motivation and behavior which cannot be predetermined. Because of the foregoing reasons, psychiatrists can hope to make valid predictions of unsatisfactory service only for brief periods of time under known and relatively uniform environmental conditions, such as the training phase.

*Professional differences among psychiatrists influence prediction.* The six examining psychiatrists of this study, although fully qualified by training and experience, nevertheless exhibited individual patterns of predicting military performance. Among the psychiatrists there was considerable variation in both the type and proportion of subjects estimated to render unsatisfactory duty. This aspect of psychiatric selection will be more fully explored in a later report.

*2. Psychiatric criteria can identify groups of varying military effectiveness.*

The results of this study indicate that relative degrees of predisposition or adaptability to military stress can be demon-

strated in groups of individuals. Certain psychologic and sociological data that include school and work record; educational attainment; community, social, and recreational adjustment; the AFQT; judgment of line officers, and the clinical impression of the psychiatrist were found to be significantly related to military performance. By using any of the foregoing criteria, inductees could be classified into one of the following categories (based upon percentage of effective individuals); namely, (1) superior, from 90 to 95 per cent; (2) average, from 80 to 90 per cent; and (3) inferior, from 70 to 80 per cent.

Predictors that contained some measurement of intellectual ability provided the most practical index of potential military effectiveness. This conclusion is supported by findings that school record, educational level, the AFQT, and intelligence ratings by psychiatrists are highly correlated with each other and as individual rating devices gave better predictive relationships to military performance than other background data. Educational attainment was perhaps the best predictor of the intellectual measures. This information achieved a useful discrimination among the subjects for it placed the largest proportion (60 per cent of the total) in a superior group and correctly predicted the highest percentage of unsatisfactory duty in the inferior category (tables 17 through 19). Moreover, educational level is a relatively simple and concrete type of information that can be obtained from the inductee with a minimum of distortion, although, admittedly, standards of education do vary in the various geographic regions of the United States.

That inductee or selectee groups of varying efficiency can be identified by psychiatric data has also been demonstrated by Aita<sup>9</sup> and others.<sup>4,9,10,11</sup> Indeed it is this aspect of psychiatric prediction which has given rise to the optimistic statements made by Wittson and Hunt<sup>12</sup> regarding the validity and usefulness of psychiatric screening. Their contentions may be correct if the objective of psychiatric selection is to insure the largest proportion of effective servicemen without regard for the number of potentially satisfactory individuals who will be eliminated by such a process. Screening procedures of this type may be justified in the selection of officer candidates or men for highly specialized tasks, or in maintaining a relatively small cadre type Army where the limited number of individuals required make it profitable to exclude "inferior" or even "average" categories. Also, rejectees under such a program are not necessarily lost to the service. However, the huge manpower requirements of a general mobilization will not permit the losses that would occur if predisposition standards such as outlined above were put in practice. For example, in "inferior" groups the removal of three potential failures

would also eliminate seven others who were capable of satisfactory military service. In order to meet the needs of the armed services during wartime, psychiatric selection methods must be sufficiently accurate to identify an inferior group, more than 50 per cent of whom will inevitably become a burden to the military effort.

### SUMMARY

Psychiatrists, the AFQT, and various components of the mental examination were unable to efficiently identify potential military failures. From the standpoint of general mobilization, these results indicate that further investigative efforts should be undertaken during this peacetime era in order to insure more accurate methods of psychiatric screening because they will be vitally needed in the event of another major conflict.

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### THE "COMMON" MAN

"The patient who is a living detective-story may also be, I suggested, a poem of many parts that can, from time to time, reflect the light of sublimity. This you may find hard to credit when you examine some shrivelled little man with hammer-toes and a smoker's cough; but even he, even the most drably insignificant of your patients, will have had some experience of the wonder and mystery in which we live, and confidently he can expect more. He was born, and he will die; and no one who has seen birth and death can deny that 'fearfully and wonderfully are we made,' or dispute the mystery that envelops us and, at the end, gives to the meanest a moment of dignity.

—ERIC LINKLATER  
in *British Medical Journal*  
pp. 1518-1519, Dec. 24, 1955

# CUP AND REPLACEMENT ARTHROPLASTIES

## Experiences in an Army Hospital

JAMES D. CASKIE, *Lieutenant Colonel, MC, USA*  
JOSEPH W. BATCH, *Colonel, MC, USA*

SINCE the popularization of hip arthroplasty with the vitallium cup method of Smith-Petersen,<sup>1</sup> and more recently with the replacement prosthesis methods of Judet,<sup>2</sup> Eichler,<sup>3</sup> Moore,<sup>4</sup> Thomson,<sup>5</sup> Niden-Rieth,<sup>6</sup> and others,<sup>7-10</sup> much has been written on each of these methods as means of treating various conditions affecting the hip joint. The study herein reported was undertaken to compare the various methods employed in this hospital, where individual orthopedic surgeons have used different methods of arthroplasty.

TABLE 1. *Pathologic hip conditions treated at Brooke Army Hospital (1949-1955)*

Hip condition	Number
Fractures (all kinds)	224
Aseptic necrosis	10
Nonunion, fractures	39
Dislocations, traumatic	93
Dislocations, congenital	72
Ankylosis	49
Gunshot wounds	13
Arthritis	23
Tumors	5
Degenerative joint disease	5
Total	583

From 1949 through 1955, 583 pathologic conditions involving the hip joint were encountered (table 1). Of those 583 hip conditions, 43 (in 40 patients) were deemed amenable to treatment with 19 cup and 24 replacement prosthesis arthroplasties. The conditions for which these arthroplasties were performed are listed in table 2.

From Brooke Army Hospital, Fort Sam Houston, Tex. Lt. Col. Caskie is now assigned to Fitzsimons Army Hospital, Denver, Colo.

TABLE 2. *Conditions for which cup or replacement arthroplasties were performed*

Condition	Arthroplasty	
	Cup	Prosthesis
Traumatic arthritis	2	2
Unsatisfactory Judet prosthesis		1
Osteoarthritis	2	1
Rheumatoid arthritis	3	4
Septic arthritis—old	4	0
Aseptic necrosis, head of femur	6	3
Fracture, simple, comminuted, neck of femur	1	5
Fracture, open, gunshot wound, head of femur		1
Nonunion, fracture, neck of femur		7
Pathologic fracture, neck of femur	1	
Total	19	24

## INDICATIONS

Initially in this series, cup arthroplasties were employed exclusively; during the early 1950's replacement prostheses began to be utilized; and more recently, with a crystallization of indications for the type of treatment, cup and replacement prostheses have been utilized about equally.

In general, whenever only the head of the femur was damaged, cup arthroplasty was employed. A Judet type prosthesis was used when the condition of the head precluded nailing, bone graft, and osteotomy and where sufficient length of neck remained. When the head and neck were destroyed, an intramedullary type of prosthesis was employed (table 3).

TABLE 3. *Types of arthroplasties performed by years*

Year	Cup	Judet	Thomson	Moore	Eicher	Naden-Rieth
1949-1950	6					
1950-1951	3	4				
1951-1952	3	8				
1952-1953	1		1	3	1*	
1953-1954	3	1		1		1
1954-1955	3			3		1
Total	19	13	1	7	1	2

\*This replaced one of the Judet prostheses inserted during 1950-1951.

The principal conditions for which cup arthroplasties were performed were aseptic necrosis of the femoral head, traumatic arthritis, and osteoarthritis. Prostheses were utilized primarily

for fresh, comminuted fractures of the head of the femur in the younger age group; fresh, comminuted fractures of the head and neck in the older age group; and persistent nonunion of fractures of the neck of the femur. The earlier prostheses were of the Judet type, more recently only the metallic replacement prosthesis has been employed.

There was one patient in the 50-60 year age group with bilateral cup arthroplasty, one patient in the 20-30 year age group with a bilateral Judet prosthesis, and one patient in whom an original Judet prosthesis was replaced with an Eicher prosthesis. This Judet prosthesis, originally inserted for traumatic arthritis, was an early nylon type which on removal showed marked roughening of the head portion and areas that appeared to have been worn down as if synovialized during joint motion. Seventeen patients were female and 23 were male, with an average age of 33.8 years in the cup group and 49.4 years in the prosthesis group (table 4).

A variety of approaches and modifications were employed, but the posterolateral approach was considered to be more functional, technically easier, and less traumatic, allowing earlier rehabilitation.

#### COMPLICATIONS AND FOLLOW-UPS

In this series of 43 operations performed on 40 patients, 4 patients were lost to follow-up. Sixteen patients with 17 cup arthroplasties have been followed an average of 31.8 months, and 20 patients with 22 replacement prostheses have been followed an average of 29.7 months (table 5).

There were 28 complications—12 in the cup arthroplasty group and 16 in the prosthetic replacement group. The complications, which compare favorably in number and type with other similar series,<sup>11,12</sup> are listed in table 6. They include 3 dislocations of the hip, 4 fractures of the neck or trochanter including 1 fracture dislocation in a Judet prosthesis, 2 cases of thrombophlebitis, 2 sciatic nerve injuries, and 4 infections or reinfections. Three of these were reinfections in old septic hips, which in two cases ultimately resulted in satisfactory ankylosis. There were no deaths in the series, although two patients have subsequently died—one patient four years after insertion of a Judet prosthesis and the other one nine months after the insertion of a Moore prosthesis. Pain, although listed as a complication, was slight in nature in three patients and was not a major factor resulting in limitation of motion or function. One patient with a Moore prosthesis was entirely relieved of pain by an obturator neurectomy. In the five fractures that were encountered, three occurred in the reduction of the prosthesis at time of surgery and two resulted from falls. There was one fracture dislocation in which the fracture eventually healed with the Judet prosthesis dislocated. The

TABLE 4. Types of arthroplasties performed by age of patient

Age of patient (years)	Cup		Nadeu-Rieth		Judet		Moore		Eicher		Thomson		Total
	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	
0-10													
10-20	2	1				2				1			2
20-30	4	2		1		1						1	10
30-40	1					1							6
40-50	4					1							6
50-60	3		1			3	1						7
60-70	1	1			2	1	1						8
70-80						1	1						4
Subtotal	15	4	1	1	6	7	3	4		1		1	43
Total	19		2		13		7		1		1		43

remaining fractures healed, but two resulted in marked limitation of motion, one in a cup arthroplasty and one in a Judet prosthesis. The remaining dislocations produced no problems other than the required secondary reduction, and both ultimately showed excellent results. Both patients in whom thrombophlebitis was a complication recovered; one returned to duty and was capable of playing 18 holes of golf.

TABLE 5. *Average follow-up time*

Duration of follow-up (months)	Type of arthroplasty	
	Cup	Protheses
6	1	3
12	2	1
24	6	7
36	2	5
48	3	2
60	2	2

TABLE 6. *Complications*

Complication	Type of arthroplasty					Total
	Cup	Judet	Moore	Eicher	Thomson	
Pain	1	1		1		3
Dislocation	1	1			1	3
Infection	3				1	4
Fracture, neck of trochanter	1	2	1			4
Shortening (1 inch plus)	2	2				4
Fracture, femur, in fall	1					1
Thrombophlebitis		1	1			2
Limitation of motion	2					2
Sciatic nerve injury	1	1				2
Arthritis		1				1
Myositis ossificans		2				2
Total	12	11	2	1	2	28

## RESULTS

In spite of a large number of complications, the final results in the follow-up cases were satisfactory (table 7). In the prosthetic replacement group, 86.3 per cent, and in the cup arthroplasty group, 76.4 per cent were considered to have excellent or good results. In evaluating the end results, range of motion, gait, freedom from pain and limp, and functional capacity were considered. The average range of motion of the hip in patients



with a prosthesis was 85° of flexion and 19° of abduction. In those patients who had a cup arthroplasty, the average range of motion was 89° of flexion and 21° of abduction. One patient with a Judet prosthesis and one patient with a cup arthroplasty complained unusually of pain and limp, but in both cases there was shortening of more than 1 inch. The patient with the Judet prosthesis obtained marked relief and improvement in gait after a lift was applied to the shoe. One patient with cup arthroplasty who had 2½ inches of shortening was given a 1-inch shoe lift, with marked improvement in gait and decrease in pain. This patient returned to duty as a traction and cast-room technician. Two patients with sciatic nerve damage walked well with foot-drop spring braces. One of them recovered totally and after two years discarded his brace.

TABLE 7. *Results of arthroplasties*

Type of arthroplasty	Result					Total
	Excellent	Good	Fair	Poor	No follow-up	
Moore	4	2	1			7
Eicher	1					1
Thomson		1				1
Naden-Rieth	2					2
Judet	5	4		2	2	13
Cup	9	4		4	2	19
Total	21	11	1	6	4	43

## SUMMARY

Of a total of 563 pathologic hip conditions, 43 conditions in 40 patients were treated by cup or prosthetic replacement arthroplasties. Although a large number of complications were encountered, the end results in both the prosthetic replacement and cup arthroplasty groups were considered satisfactory. This was particularly true when the proper surgical procedure was selected for the indications present in the individual patient, with consideration of cup arthroplasty in the younger age group and prosthetic replacement in the older age group.

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### FRACTURES OF THE FIRST RIB

"In dealing with closed thoracic injuries, especially those produced by high speed automotive accidents, one is obligated to search carefully for evidence of first rib fracture, which may be easily overlooked before callus formation begins.

"Patients suffering such fractures, without early manifestations of mediastinal lesion, must be thoroughly examined at frequent intervals; for at least two years following injury. Each examination should include an x-ray of the chest.

"Widening of the superior mediastinal shadow in the vicinity of the aortic arch following chest injury should be considered a sign of possible incomplete rupture of the aorta, or other great vessel, from which aneurysm may develop."

—THOMAS W. HDLMES, Jr., M. D.  
RUSH E. NETTERVILLE, M. D.  
in *The Journal of Thoracic Surgery*  
pp. 89-90, July 1956

# ON THE READING OF MEDICAL LITERATURE

With Remarks on "The Derailment of Reason"

ALAN GREGG, M. D.

WHEN I was a student in Harvard Medical School, in 1915, I was piqued because I heard frequent praise of the Harvard Law School and rarely anything comparable regarding the Medical School. So I decided to cut my classes for three days and go to Law School lectures. It was worth it. I was surprised and deeply impressed to see how much attention was given in the Law School to learning *how* to think, as contrasted with learning *what* to think. In essence it seemed that the difference was between the dynamic and the static—how to think prepared you for the future, what to think recorded the past.

I have begun with this story and the distinction between learning how to think and learning what to think, because I believe that the cardinal requirement for effective reading of medical literature is discrimination, and discrimination depends directly on learning how to think. Even today our medical schools pay little or no attention to this essential skill.

In 1928 the organizer of the British Medical Research Council, Sir Walter Fletcher, asked me, "What do you think about the medical curriculum?" It appeared clear to him that the factual additions to knowledge made by medical science had already passed the capabilities of even the best students to master in four years, and there was no reason to suppose either that the important facts would become fewer, or that another year or two could be added to the medical school's share in the preparation for medicine. He thought that the only solution would be found in a totally fresh review of medical education and the curriculum thereof. He suggested that attention be given first of all to choosing the capacities or abilities essential to every practitioner, researcher, or teacher. Once these capacities had been agreed on, we could devote the curriculum to strengthening and refining them, leaving to the years of practical clinical or laboratory experience as much as possible of the memorizing of facts and the acquirement of skill.

Presented as the Fifth Annual Harold W. Huggins Smith Guest Lecture, U. S. Naval Medical School, Bethesda, Md., 28 April 1955.

Dr. Gregg was for 21 years Director for the Medical Sciences and now is Vice President of The Rockefeller Foundation, 49 W. 49th St., New York 20, N. Y.

I do not remember whether he named these capacities, but after long reflection I would suggest that they are these: the capacity to observe, the capacity to reason from your own observations, the ability to compare your observations and reasoning with the observations and reasoning of others, and, at quite a different level of performance, the ability to put yourself in the place of the patient—to acquire or develop compassion. You can readily see that the capacity to read medical literature forms a large share of the task of comparing your observations and reasoning with that of others, and let me add that the best—not the only, but the best—time to read medical literature is after you have done some observing and reasoning of your own, and not as a substitute for it.

When I say reading I mean critical reading. Even as you read this sentence (if you are a discriminating reader) you will say "critical of whom and of what?" My answer would be: critical of the author, whoever he be, and of his reasoning as well. The classic definition of rhetoric throws delightful light on this problem, for it says, "Rhetoric is the art of conveying conviction without resort to logic." Shades of the Docteur Molière! What a soft warning! It is even possible that if you begin by learning to read other people's writing critically you may thereby learn, even though it be at long last, to be effectively critical of what you yourself say and write.

The question "critical of what?" puts its roots into a larger area and to a greater depth. I have found much illumination in a remark attributed to Oscar Wilde to the effect that "all criticism is a form of autobiography." For example, General von Blücher's critical appraisal of Paris tells us more about Blücher than it does of Paris. He said of Paris, "*Was für plündern!*" We are usually only half aware of how often and how much our past individual experience affects our capacity to evaluate as well as to reason. Nor do we always realize the subtlety of such influences; they often supply us with major assumptions that are quick and plausible but completely wrong. The physician who bases his conclusions on the experience of civilian practice can disagree both honestly and correctly with a colleague whose practice in the Armed Forces has given him a radically different experience.

Scarcely ever can one find a mountain that looks the same from the north as it does from the south. Reality is like that; it has many aspects and can only be fully portrayed by views that are not identical nor even similar, because they are views from different points of the compass. Here appears the major argument for reading; namely, that it makes available to you glimpses of truth that you have not seen. In binocular vision or a stereoscopic camera, the two images are not identical; and from the very fact

that they are not the same, a new sense, that of distance, becomes possible. The gains from reading usually come from the contrast between what the author has observed or concluded and what you have noted and inferred.

But sometimes you read about work in a field of which you have had no experience. What then? Well, rather obviously, you are in that case in need of a clear and comprehensible exposition, rather than the type Lord Balfour had in mind when he spoke of "things that would have been clearer if they had not been explained." Authors whom I find worth reading use description and narration to tell what something is, and definitions to tell what it is not. The hallmarks of a good exposition are that it translates or formulates *the less familiar into terms that are more familiar*; it translates *the obscure into the clear, the variant into the constant, the complex into the simple, the vague into the precise, forms into functions, and states into forces*.

Before expanding such a condensed statement and to anticipate your possible objection that you don't see how all this can bear upon the question of how to read medical literature, let me say that if an author follows none of these requirements in the first few pages of his article, I save a wonderful amount of time by refusing to read further. With the almost fantastic amount of reading we all should do, knowing what not to read becomes a cardinal point of progress in the general task of learning how to read. Some sort of selection is necessary, and I find that it is better to base one's reading on the quality of the author's mind than to select it on the title or the field of his experience. I would therefore suggest a few particulars to keep in mind when you start to read a scientific article.

First, an author of a scientific article fails in his purpose if he puts his ideas, even though they may be familiar to him, into terms that are quite unfamiliar to most of his readers. (There is one qualification to be made on this point that I will mention later.) I saw once in a psychoanalytic journal this statement: "Music is pure libido symbolism lacking objectification or cathexis." And some of you will remember Dr. Johnson's definition of a cough as "a spasm of the diaphragm vellicated by some sharp serosity." It is the reader's need—if not his right—to have the unfamiliar made familiar and the obscure made clear.

Another desideratum in medical literature is that the constant be shown as lying behind the variant. The capacity to detect and to convey this kind of clarification often improves as a result of some measure of sophistication in regard to the mathematics of probability. I would be glad to see solid geometry disappear from secondary and college curricula in favor of an equally rigorous study of the mathematics of probability, and would welcome

a wider acquaintance on the part of medical scientists with rhythmic and cyclical phenomena and the technics of detecting their occurrence and their intervals. F. R. Dewey had his associates are doing pioneer work in this field that for the most part appears in "Cycles," a monthly report of the Foundation for the Study of Cycles.

The scientific mind so frequently simplifies the complex by means of a formula, that if an article you read performs exactly the opposite and makes the simple more complicated, it deserves to be regarded with suspicion. I am less certain regarding two more characteristics of a good scientific article, perhaps because they are rarely to be found, rather than because they are trivial. Indeed they are anything but trivial. When form can be translated into terms of function, or states of being into terms of forces, we are near the cutting edge of the semitar of science.

Lastly, one of the most important functions of good medical literature is to render the vague more precise. The psychologist, E. B. Holt, said, "A word that has many connotations denotes nothing, and a word that denotes nothing cannot have connotations." For example, the word water has many connotations, but  $H_2O$  denotes just one chemical compound. Experience in putting that dictum to the test has suggested to me the thesis that one of the essential differences between scientific language and literary language consists of the fact that scientists express themselves in denotative terms, and literary artists—particularly the poets—have mastered the connotations of words.

Now all these comments point to an exceedingly interesting subject, namely notational systems. Many sciences develop their own signs and symbols, and unless we become thoroughly familiar with the notational system of a particular science, we find reading it extremely tiring and are all too ready to declare that what we read as beginners fails completely to put the less familiar into the more familiar, the complex into the simple, the obscure into the clear, the connotative into denotative terms, the variant into the constant, or the vague into the precise. Getting accustomed to symbols requires much effort, but using them effectively rewards the user remarkably. For this reason, we usually do not stop to wonder whether the symbols are really adequate for their purpose, forgetting that explanations in a notational system that is not adapted to the subject to be explained become needlessly complicated and hard to grasp. Think of trying to record the operations of the Stock Exchange in musical notation! It seems to me that there are at least two fields, endocrinology and serology, where we have not yet found the right type of symbols or denotative terms for the kind of thinking that is needed.

True familiarity with the symbols involved in some branch of science serves to protect us from glibness in using them. Not

long ago Mr. Fred McNamara of the Bureau of the Budget asked me if I knew what a billion dollars was. I replied that I could write the figure and that the word billion has one meaning in Europe and quite a different one in North America, but that I really did not know what a billion dollars was, so he told me: "A packet of a thousand \$1,000 dollar bills eight inches high is a million dollars; a billion dollars is a pile of \$1,000 bills 111 feet higher than the Washington Monument." For all its precision and its effectiveness, the decimal notation tempts one to glibness—and incomprehension.

Much could be said about notational systems and how they work, but perhaps their best effect is in drawing our attention to the kind of thinking that we use in medical science. Because I believe that explicit attention to this thinking will provide the most valuable ways to read or refuse to read medical literature, I would like to explore a little further our methods of making observations and sensible inferences. Probably a brief narrative will serve my purpose.

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and adverbs you have a right to expect in almost any serious writing in the medical sciences.

Consider the statement: "Mosquitoes transmit malaria." Of such a statement one can say that it reports a brilliant discovery and that it is profoundly true and important, but also one can say that as a statement it is distressingly unsatisfactory. What is needed are qualifying modifiers such as *all* or *some*, for both the subject and object. For the verb, such modifiers as *always* or *sometimes* may be required. Finally, the word *only* may be needed as a modifier for subject, verb, or object. When the correctly selected qualifying words have been put in, you have something cogent, resembling cabinet work rather than three logs lashed together with a liana vine. The accurate choice of the correct modifiers of the subject, verb, and object in the case of the unchallengeable statement, "mosquitoes transmit malaria," makes the final statement conclusive as well as clear. Broadly speaking, if you pick up a reprint and the subjects, predicates, and objects have no qualifiers of the above-mentioned sort, you are not in first-class intellectual company, and you proceed with the reading at your own risk. So much for the best sieve I know of for separating the wheat from the chaff in medical literature.

One of the most frequent purposes of scientific papers relates to finding the causes of some phenomenon or condition, but most medical scientists seem completely oblivious (or ignorant) of the fact that results usually come from many causes, not one. I doubt if I could exaggerate my feelings regarding the stupidity we show in so frequently assuming that one result is due to only one cause. We ought to use the word *why* in the plural and ask, "Whys is this patient in coma?" not, "Why is this patient in coma?" The next time you hear someone say anything that attributes a single cause for some event, ask yourself if he means the predisposing, the precipitating, or the perpetuating cause? And how many causes of each of these kinds are involved? A particular case of a fractured jaw in a sailor may be the result of convergent causes—no letters from home, too much alcohol, the loan of a car by a friend, a dark night, an oncoming car on a road covered with ice at a curve, the fact that the left-hand rule is used in the British Isles, new brake linings, a skid, and a telephone pole. These constitute the whys, not the why, of a fractured jaw. It is a cataract of consequences. Take out any one of these whys and the accident would not have occurred. When will we wake up to the importance of multiple causation? Some prefer to call it convergent causation. I am as sorry for those physicians who have never heard of "Occam's Razor" as I am for those who have never heard of Gillette's.

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Whenever you hear it stated that A causes B, you can get a sort of intellectual setting up drill by saying to yourself, "I

wonder if it isn't wiser to say that B causes A?" For example, it is fairly probable that in the next six months you will hear it said that some acquaintance "has had a nervous breakdown from overwork." Ah! There is an implication that overwork has caused a nervous breakdown. How would it be to reverse the interpretation and conclude that the man overworked because of self-doubt or overconscientiousness, which are early symptoms of some kinds of oncoming nervous breakdowns? Perhaps depression or insecurity inclined him to stay at the office until a quarter of eight instead of quitting at five o'clock as he used to . . . and then to a quarter of ten, and then to midnight. And at a later stage, when he had exhausted his sense of fatigue, staying all night at work. I have found this particular form of mental gymnastics not only diverting but at times remarkably rewarding—which is more than I could honestly say of the usual kind of gymnastics.

Quite naturally, if we are unaware of the frequency of multiple causation, we are the easy victims of plausibility; we stop looking for more than one cause if the one that occurs to us seems plausible. Let me give you, to illustrate the subtle way in which plausibility can kill true curiosity, an experience that I will disguise by changing the scene to a distant city. I was attending a medical lecture in Liverpool, England, given by an Irish physician. He failed to hold my attention. I began to watch a device behind the speaker which flashed the names of doctors in the audience who were wanted on the telephone. I noted that an unusually large number of the names were Irish; 17 out of 19. Now 13 out of 19 would not have been above the probabilities of chance, but 17 out of 19 was well above being a chance event. What could explain that? Being amused by the number of plausible explanations, I listed them. Here is the list, and any one of the reasons might have seemed so plausible as to stop any further inquiry:

1. The Irish population in Liverpool is unusually large.
2. The medical profession in Liverpool contains a very high proportion of Irishmen.
3. Irish doctors are notably conscientious about keeping up with advances in medicine by attending lectures.
4. Irish doctors want to be seen attending lectures.
5. Irish doctors are unusually compassionate and ready to sacrifice even such opportunities as professional lectures to the whims of their patients.
6. Irish physicians employ nurses who need close supervision or who are excessively conscientious.
7. The patients of Irish physicians want their money's worth and are not phlegmatic or submissive.

8. The lecture hall was in the Irish sector of Liverpool.

9. Irish doctors flocked to hear the lecturer because he was an Irishman and a graduate of the National at Dublin.

10. The Irish doctors in Liverpool want their names to be better known and crave the appearance of being busy.

11. The lecture was on a disease very common among Irish people.

12. The prestige of the Irish doctors in Liverpool has become so great that English physicians are changing their names—for, mark you, all I was seeing was Irish *names*, not necessarily Irish *men*.

As a last remark on the risks of mere plausibility, let me call your attention to the fact that all these circumstances *might* have been true simultaneously.

As another example of plausibility, let us assume that a substance not frequently found in urine has been reported in one of your patients. Among the plausible explanations are: (1) It was ingested and when present is routinely excreted by the kidneys. (2) It is normally present in the blood and is usually put out only by a so-called leaky kidney. (3) It is normally stored in the bones and has been released by the ingestion of some other substance, *e. g.*, lead released from the long bones by the ingestion of large quantities of phosphoric acid. (4) It is usually excreted by some other organ such as the lungs or the skin, but this mechanism is interfered with and the kidney takes over the task. (5) It was not ingested but is the product of faulty metabolism, *e. g.*, an adrenal neoplasm. (6) There was another patient with the same name and the specimens were mixed.

From these examples you can see that an article in any current journal that fails to list all of the plausible explanations for an event should show cause for limiting its attention to just one of them.

Let us pass from the pitfalls of plausibility to the equally misleading failures due to an ignorance of the laws of probability. We cannot rely upon good horse sense in such matters. What do you think are the probabilities that at a dinner attended by 20 people there will be at least one pair who share the same day of the same month as their birthday? Are you surprised to know that it is better than a 50-50 chance? More precisely it is a 52.05 chance. Does that disturb your confidence in your common sense? It did mine.

The commonest failure I note in most medical articles is the assumption that in a short series of cases, say 41, a positive result in 26 is evidence of something more than chance. I can offer you in this connection a simple formula the mathematician R. A. Fisher gave me as a reliable criterion for drawing sound

inferences from small numbers, *i. e.*, a good working rule to apply. Let the total number of cases be called  $a + b$ ,  $a$  standing for the number of positives and  $b$  the number of negatives. You are reasonably safe if  $\frac{(a - b)^2}{a + b}$  equals 4 or more. Thus, in a series

of 41 cases, if 26 are positives and 15 are negatives, the result works out to only 2.9, and 26 out of 41 is not significant because it does not significantly exceed mere chance. But if there had been 27 positives and 14 negatives, then  $\frac{(a - b)^2}{a + b}$  would have

equaled 4, which begins to be significant. This formula is readily applied to many a medical report, and I have found it a valuable criterion to apply in reading case reports.

Some day you may have time to kill. Flip a penny 1,500 times and keep a record of the results. I did this once and got 755 heads and 745 tails. Very reassuring! But in that series I had one run of 12 heads in succession. Supposing that a run of 12 successive cures, or at least remissions, should be observed when first using a new drug for patients with multiple sclerosis. How could one fail to become a convert to such a drug? It is a very sobering reflection, and has led me to believe that one of the great needs of medicine, and particularly for men in research work, is a course in evidence. Intensive drill in distinguishing between hunches, surmises, varying degrees of probability, and the nature of certainty or proof could be an extraordinarily valuable experience for most of us.

One more suggestion and I am through. When a train wreck occurs, the railroad officials want to find out the whys and the hows: was it due to a defective rail, roadbed, bridge, signal, item of rolling stock, or human reaction? Now, when as medical scientists we try to keep our thinking, observations, and inferences on the right track, we too are fatefully subject to one or another kind of derailment of our reasoning. The different kinds of the derailment of reasoning deserve closer study than they are getting. Indeed, I had thought of entitling this lecture, "The Derailment of Reason," but I thought that if I could call it, "On the Reading of Medical Literature," I could interest you first in the errors of others' thinking and then you could, with these errors in mind, turn your attention in slow crescendo to the mistakes that all of us make. Moreover, a new kind of approach lies at hand. The history of medicine is loaded with false interpretations of biologic phenomena, inferences that were but derailments of reasoning. Clinical observations have been wonderfully good, in comparison to the inferences drawn. Let us study, clarify, and classify such derailments of interpretation or reasoning, in order to improve our performance in keeping on the track. For as George Santayana said, "He who is disposed to ignore history must be prepared to repeat it."

# CONCURRENCE IN PSYCHIATRIC DIAGNOSIS

WILLIAM A. BUNT, *Commander, MSC, USN*  
CECIL L. WATSON, *Commander, MC, USN*

THE QUESTION of diagnostic concurrence, or agreement among psychiatrists, is one that has concerned us in our continuing study of the theory and practice of naval psychiatric selection.<sup>1,2</sup> Since the diagnostic process is basic to any selection procedure, we have considered its implications<sup>3,4</sup> and experimentally studied some of its characteristics.<sup>5,6</sup> This article compares the diagnoses given a group of recruits under psychiatric observation during basic training with the diagnoses assigned when they were subsequently discharged during later active duty. It not only studies diagnostic agreement among psychiatrists, but offers further information on the discharge channels typical of different types of psychiatric cases.

## PROCEDURE

During World War II those recruits undergoing basic training at the Newport Naval Training Center who were suspected of serious psychiatric involvement were admitted to the observation ward of the psychiatric unit for careful study before disposition. Those borderline patients considered capable of rendering adequate service were returned to active duty. Subsequently many of these received psychiatric discharges from the fleet, offering an opportunity of comparing the discharge diagnosis with that assigned on the observation ward at Newport. The present experimental sample thus consists of men diagnosed on the observation ward at Newport, sent to duty, and subsequently discharged during service with the fleet. It should be stressed that all these were borderline cases and therefore presumably more difficult to diagnose.<sup>5,6</sup> Also, the Newport diagnosis was not entered in the health record and thus could not have prejudiced the final discharge diagnosis. Moreover, the time elapsing between the original diagnosis and ultimate discharge ran in some cases to as long as three years.

Since the psychiatrists on the Newport ward were not held to any specific diagnostic nomenclature while the final fleet diagnosis had to conform to official naval nomenclature, it was felt that any comparison involving specific, detailed diagnoses would

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inferences from small numbers, *i. e.*, a good working rule to apply. Let the total number of cases be called  $a + b$ ,  $a$  standing for the number of positives and  $b$  the number of negatives. You are reasonably safe if  $\frac{(a - b)^2}{n + b}$  equals 4 or more. Thus, in a series

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## PREFACE

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Since the psychiatrists on the Newport ward were not held to any specific diagnostic nomenclature while the final fleet diagnosis had to conform to official naval nomenclature, it was felt that any comparison involving specific, detailed diagnoses would

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be unfair. For comparison we therefore selected the broad categories of psychoneurosis (PN) and personality disorder (PD). It would have been desirable to include a psychotic category, but all men falling in this category were automatically discharged at Newport and none were sent on to the fleet. No organic cases were included in the study. Since disciplinary and general medical discharges are also known disposal outlets for psychiatric involvement, we included such final fleet discharges in our study, hoping that interesting differences in our groups might appear. Thus, the criteria for inclusion in the sample studied were that the man must have been diagnosed on the observation ward during basic training at Newport, subsequently sent to duty, and later discharged from the fleet for psychiatric, medical, or disciplinary reasons.

The sample studied consisted of 82 recruits originally diagnosed as psychoneurotic and 213 diagnosed as having a personality disorder. As a control we included 28 men showing symptoms of psychoneurosis, such as anxiety, tachycardia, tremor, depression, et cetera, but whose symptoms were not sufficiently pronounced to permit them to be definitely diagnosed as psychoneurotic; and 62 men showing symptoms typical of the personality disorders, such as immaturity, history of many arrests, nomadism, et cetera, but who were not definitely diagnosable as such. Also included as a control were 40 men studied on the observation ward and judged to be normal.

## RESULTS

The results are presented in table 1, which gives the percentage of each original diagnostic group falling in each of the final discharge categories. Comparing the original with the final psychiatric diagnosis, we find that of all the cases originally diagnosed as psychoneurotic and subsequently receiving a psychiatric discharge from the fleet, approximately one half received a diagnosis of psychoneurosis, with the majority of the remainder being discharged as personality disorders. In view of the borderline nature of the cases and the amount of time elapsing between the original and the final diagnosis, the diagnostic agreement would seem to be fair and would indicate some efficiency in the original diagnostic performance. Some confusion obviously exists between the psychoneurotic and personality disorder categories, however. These results are confirmed by the group which showed psychoneurotic symptoms but which could not be definitely diagnosed as psychoneurotic. Turning to the group with personality disorders, we find that approximately three quarters of those subsequently receiving a psychiatric discharge were discharged as personality disorders. Again, this is confirmed by the group with only symptoms of a personality disorder. The agreement here is certainly good. It would appear

that the diagnosis of personality disorder is a more reliable one than that of psychoneurosis, a finding that confirms those of a previous study of ours.<sup>6</sup> The personality disorders seem to be more reliably identified than the psychoneuroses.

TABLE 1. Agreement between Newport diagnosis and final discharge diagnosis

Newport diagnosis	Number of diagnoses	Final and subsequent diagnosis					
		PN*	PD*	PN+PD**	Other	Medical	Disciplinary
Psychoneurosis	37	27	26	1	4	2	37
Psychoneurotic symptoms	23	43	19	0	2	0	20
Personality disorder	213	0	20	2	4	41	13
Personality disorder symptoms	81	2	32	0	4	17	21
Normal controls	40	3	3	3	8	17	33

\*PN = Psychoneurosis

\*PD = Personality disorder

\*\*PN+PD = All disciplinary discharges

When we look at the other medical and disciplinary discharges, we find some interesting differences between the groups. The psychoneurotics are significantly less apt to receive a disciplinary discharge than are the men with personality disorders, who show a marked tendency to disciplinary difficulties. The psychoneurotics are even less of a disciplinary problem than the normal men. On the other hand, the psychoneurotics tend to be free of a medical problem than those with personality disorders. These findings confirm another investigation by us.<sup>7</sup> Moreover, these differences are in agreement with the clinical interpretation of the disorders and show that the psychiatric diagnosis predicts important aspects of the individual's social behavior. As would be expected by the definition of "normal," psychiatric and disciplinary discharges are relatively infrequent outlets for our normal control group.

These findings on disciplinary and medical discharges demonstrate the importance of considering these disposal channels in any study of the psychiatric serviceability of military personnel. They also raise a question concerning the study of the reliability of psychiatric diagnosis; i. e., if a recruit is diagnosed as an asocial personality and subsequently receives a bad conduct discharge, or if he is diagnosed as psychoneurotic and subsequently receives a medical discharge for some psychosomatic complaint, are not these examples of diagnostic concurrence rather than the disagreement superficially implied by the difference in the channels of disposal?

## SUMMARY

The study of a group of recruits, originally diagnosed as having psychoneurotic or personality disorders but subsequently sent to duty as borderline cases, who were later discharged from the fleet for psychiatric, other medical, or disciplinary reasons shows close concurrence in psychiatric diagnosis. As compared with the psychoneurotics, the patients with personality disorders were much more of a disciplinary problem and somewhat less of a medical problem.

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## THE SHIFTING INCIDENCE OF PSYCHOSIS

Manic-depressive psychosis and general paresis are definitely on the decline since about 1935. Rates for general paresis are much higher for men than women, but the relative difference is less in recent years than formerly. Manic-depressive psychosis rates are higher for women than men. Alcoholic psychosis shows some exceptions, a generally rising incidence, with rates that are very much higher for men than for women.

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# TECHNIC OF CREMASTER MUSCLE DISSECTION IN INGUINAL HERNIOPLASTY

FELIX P. BALLENGER, *Captain, MC, USN*

**T**HE PROPER method of dissecting the cremaster muscle when performing inguinal hernioplasty has been little discussed, yet in many cases it presents a real problem if an adequate repair is to be accomplished. In performing inguinal hernioplasties, and also when observing other surgeons performing this operation, I have noted difficulty in accurately suturing the fascium of the transversalis muscle to the shelving border of the inguinal ligament about the spermatic cord at the internal inguinal ring when the usual methods of dissection of the cremaster fibers were used. If the cremaster fibers are split in the line of their descent, or if they are allowed to continue to encircle or cover the cord structures in any manner, they will invariably obstruct the proper placement of sutures about the spermatic cord at the internal inguinal ring.

## OPERATIVE TECHNIC

In order to avoid the difficulties created by the presence of the cremaster muscle in this part of the repair, I have developed a technic for dissection in this region which completely removes the obstructions caused by the cremaster fibers, and also, in cases of recurrent hernia and large hernia, obviates excision of the cremaster in order to accomplish adequate repair. The following technic for dissection and repair of an inguinal hernia is therefore recommended, as I have used it in a large number of cases with invariable ease of suture placement and excellent results.

1. The usual inguinal skin incision is made.
2. The external oblique fascia is incised and opened in the line of its fibers into the apex of the external inguinal ring. This incision is carried about one and one-half inches above the internal abdominal ring and well down over the pubic tubercle in the external spermatic fascia.
3. The cremaster fibers are dissected free from the inguinal ligament from the pubic tubercle to one inch above the internal

## SUMMARY

The study of a group of recruits, originally diagnosed as having psychoneurotic or personality disorders but subsequently sent to duty as borderline cases, who were later discharged from the fleet for psychiatric, other medical, or disciplinary reasons shows close concurrence in psychiatric diagnosis. As compared with the psychoneurotics, the patients with personality disorders were much more of a disciplinary problem and somewhat less of a medical problem.

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## THE SHIFTING INCIDENCE OF PSYCHOSIS

Manic-depressive psychosis and general paresis are definitely on the decline since about 1935. Rates for general paresis are much higher for men than women, but the relative difference is less in recent years than formerly. Manic-depressive psychosis rates are higher for women than men. Alcoholic psychoses show, with some exceptions, a generally rising trend, with rates that are very much higher for men than women.

—SELWYN D. COLLINS, Ph. D.  
in *Journal of Chronic Diseases*  
p. 439, Apr. 1955

# TECHNIC OF CREMASTER MUSCLE DISSECTION IN INGUINAL HERNIOPLASTY

FELIX P. BALLENGER, *Captain, MC, USN*

**T**HE PROPER method of dissecting the cremaster muscle when performing inguinal hernioplasty has been little discussed, yet in many cases it presents a real problem if an adequate repair is to be accomplished. In performing inguinal hernioplasties, and also when observing other surgeons performing this operation, I have noted difficulty in accurately suturing the free end of the transversalis muscle to the shelving border of the inguinal ligament about the spermatic cord at the internal inguinal ring when the usual methods of dissection of the cremaster fibers were used. If the cremaster fibers are split in the line of their descent, or if they are allowed to continue to encircle or cover the cord structures in any manner, they will invariably obstruct the proper placement of sutures about the spermatic cord at the internal inguinal ring.

## OPERATIVE TECHNIC

In order to avoid the difficulties created by the presence of the cremaster muscle in this part of the repair, I have developed a technic for dissection in this region which completely removes the obstructions caused by the cremaster fibers, and also, in cases of recurrent hernia and large hernia, obviates excision of the cremaster in order to accomplish adequate repair. The following technic for dissection and repair of an inguinal hernia is therefore recommended, as I have used it in a large number of cases with invariable ease of suture placement and excellent results.

1. The usual inguinal skin incision is made.
2. The external oblique fascia is incised and opened in the line of its fibers into the apex of the external inguinal ring. This incision is carried about one and one-half inches above the internal abdominal ring and well down over the pubic tubercle in the external spermatic fascia.
3. The cremaster fibers are dissected free from the inguinal ligament from the pubic tubercle to one inch above the internal

abdominal ring (fig. 1). It is important in this dissection to see that all fibers are completely detached from the inguinal ligament.

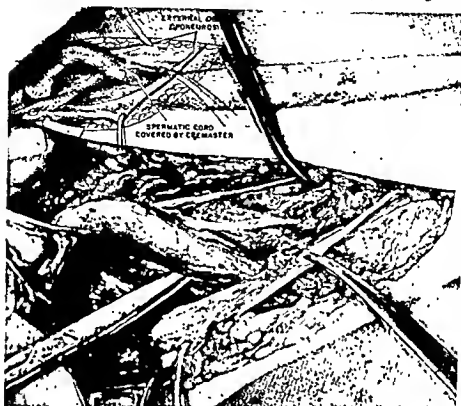


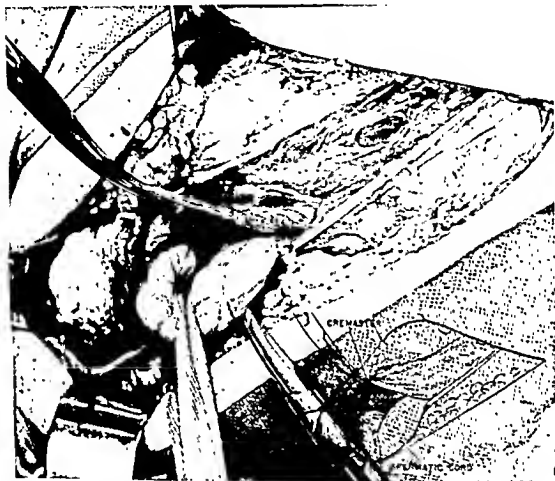
Figure 1. Beginning the dissection of the cremaster muscle. The point of the scissors is shown under the lower edge of the cremaster; at this site the cremaster is detached from its origin.

This lower border of the cremaster is then elevated and the dissection continued to elevate the cremaster muscle in its entirety from the external spermatic fascia and underlying cord (fig. 2). The entire cremaster, including its origin from the internal oblique muscle, is then retracted upward. This exposes the spermatic cord covered by the internal spermatic fascia (fig. 2).

4. The spermatic cord and its internal spermatic fascia covering can then be dissected completely free from the floor of the inguinal canal from the internal abdominal ring to a point below the pubic tubercle. When this has been accomplished all areolar tissue is removed from the inguinal canal and its floor (fig. 2).

5. The internal spermatic fascia is then incised in a line with the spermatic cord and the hernia sac can easily be brought up, dissected out completely, its neck transfixed and ligated high inside the internal abdominal ring, the sac excised, and the stump

allowed to retract upward. If, however, a direct hernia sac is present, it can be handled by whatever method seems appropriate such as dissection, high ligation, and excision or by imbrication and infolding.



*Figure 2. The cremaster has been elevated from the cord and the cord dissected from the floor of the inguinal canal.*

6. After the sac, or sacs in the case of a "Pantaloon" type, have been adequately removed or imbricated, the repair can then be proceeded with. The transversalis fascia is secured in the floor of the inguinal canal with Allis forceps, and the border of the transversalis fascia is sutured to the shelving border of the inguinal ligament with interrupted No. 00 cotton sutures (fig. 3). The sutures are placed from the medial angle lateralwards, being certain to secure the first suture into the fascia overlying the pubic tubercle. As placement of the sutures upward and outward proceeds, it becomes obvious that they can be placed on either side of the spermatic cord at the internal abdominal ring with ease without incorporating fibers of the cremaster muscle, because the cremaster and internal oblique muscles are now being retracted upward completely out of the way (figs. 3 and 4). By placing 6 to 8 sutures below and medial to the cord and 2 or 3



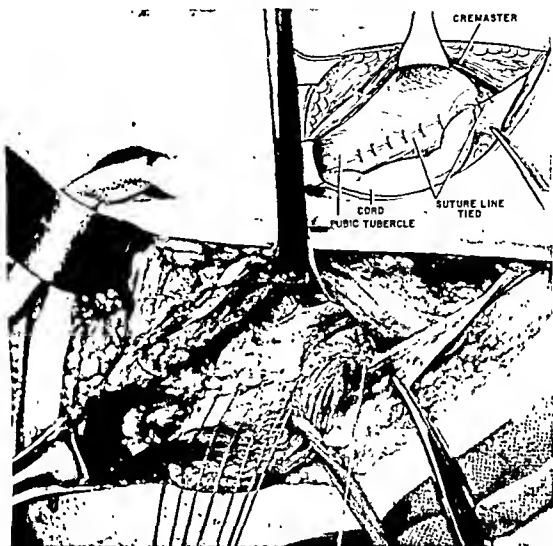


*Figure 3. Retraction upward of cremaster muscle permits easy placement of sutures in transversalis fascia and inguinal ligament.*

above or lateral to it, a snug repair around the spermatic cord usually can be obtained. In infants and children this layer of repair is not necessary and is omitted. I believe that many recurrences of indirect inguinal hernias occur because of inaccurate placement of sutures and failure to secure an adequate, snug repair about the spermatic cord. This defect can easily be avoided by using this technic of dissecting the cremaster and repairing the floor of the inguinal canal.

7. The spermatic cord is then replaced in the inguinal canal and the cremaster replaced over the cord and sutured to the inguinal ligament in its normal anatomic relationship (fig. 5). However, if it is thought desirable, the cord can be transplanted completely to the subcutaneous tissues in the Halsted repair. If the cord is replaced in the canal and the cremaster sutured over it as above described, the external oblique fascia and external spermatic fascia are then closed with interrupted No.

0000 cotton sutures and the subcutaneous tissue and skin closed with the same material. If the Halsted procedure is done the external oblique fascia is sutured beneath the spermatic cord,



*Figure 4. All sutures have been tied, apposing the transversalis fascia to the inguinal ligament.*

allowing the cord to emerge through this suture line at a point about one-half to three-fourths inches lateral to the internal abdominal ring. A bed of subcutaneous tissue is then sutured underneath the cord, between it and the external oblique fascia, and subcutaneous tissue and skin are closed over the cord, using No. 0000 cotton sutures throughout.

#### SUMMARY

A technic for dissecting the cremaster muscle from the external spermatic fascia and spermatic cord and retracting it upward along with the internal oblique muscle allows easier placement



*Figure 5. The cremaster has been replaced over the cord in its normal anatomic position, and is shown here with its lower border resutured to the inguinal ligament.*

of sutures in the transversalis fascia and inguinal ligament. This technic obviates the incorporation of the cremaster fibers in the suture above and lateral to the spermatic cord and, I believe, makes a more accurate and stable repair of this portion of the inguinal canal floor.

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*The specialist is a man who fears the other subjects.*

—Martin H. Fischer

# ADVANCES IN TRAINING THE NEUROPSYCHIATRIC TECHNICIAN

DENNIE L. BRIGGS, *Lieutenant, MSC, USN*

NORMA R. WOOD, *Lieutenant, NC, USN*

**C**HANGING technics in the treatment of hospitalized psychiatric patients have necessitated a reassessment of the role of the nursing staff. In the past, members of the nursing staff usually considered their primary duties to be providing the custodial and housekeeping aspects of patient care, and the patient was allowed little opportunity to assist in his own treatment. Today, however, their responsibilities are centered mainly about providing an atmosphere conducive to treatment, and their duties include working with patients to a greater degree. The importance of interpersonal relations in treatment is increasingly recognized and fostered in hospitals using social psychiatric technics.

We feel that although the roles of the psychiatric nurse and the corpsman are not yet fully defined, steps should be taken to provide a continuing educational program that will give them every opportunity to learn more of treatment procedures, interpersonal relations, and the dynamics of their own personalities, and to share in developing their own niche in the treatment program. It was believed that existing educational opportunities needed revision in the light of recent developments in other hospitals and of our own experience in operating an acute admissions ward without use of restraints and with only occasional use of sedatives.<sup>1</sup>

In a period of 10 months, approximately 1,000 patients were admitted to the acute admissions ward of this hospital, and it was not found necessary to put any patient in a seclusion room.<sup>2</sup> However, due to the fears and anxieties of various staff members, patients were put in the quiet rooms on five occasions. In order to operate such a unit, it becomes necessary to revise traditional methods of training and to provide means whereby corpsmen can learn to recognize and handle their own anxieties.

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From U. S. Naval Hospital, Oakland, Calif. Lt. Briggs is now assigned to the U. S. Naval Hospital, Navy 3923, FPO, San Francisco, Calif.

## CURRICULUM

The curriculum of the Neuropsychiatric Technicians School at this command has been previously described by Kahn.<sup>3</sup> This school was established during World War II when emphasis was placed on screening out obvious psychiatric misfits and on the survey of those who had psychiatric breakdowns while on active duty.<sup>4</sup> The training included highly specialized procedures such as deep insulin coma and electroconvulsive therapy and made much use of didactic lectures dealing with theories concerning the dynamics and treatment of specific mental disorders. Although there was occasional use of "milieu therapy" and brief psychotherapy, the psychiatric service and the course of instruction for technicians was primarily oriented toward physical treatment and various other suppressive and repressive technics such as sedation and restraint. In a period of less than two years the orientation changed to one in which relationship therapy was stressed on all wards, even those with acutely disturbed patients.<sup>5</sup> The transition was not always an easy one, and it involved a major reorganization of the course of instruction in the school.

Formalized didactic lectures, we found, contributed to a certain kind of defensiveness on the part of the corpsman which often made him feel extremely uncomfortable, as though he was expected to interpret psychologic material to the patient. As his training was not adequate for this, he many times found himself in an extremely frustrating situation and often resorted to suppressive measures designed to control his own anxiety rather than that of the patient. This, too, was a result of his earlier medical training in which he was taught to regard the patient as a semi-invalid whose treatment involved active physical measures.

The new student has many preconceived ideas as to the nature of mental illness, the role of the technician, and exactly what composes psychiatric treatment itself. Two of our students have vividly pointed out some of these misconceptions and have shown the importance of working with the feelings and attitudes of the staff as well as those of the patient.<sup>6-7</sup>

One problem with which we were particularly concerned was the corpsmen's lack of participation in the patients' groups and in the ward staff meetings, and their failure to attend psychiatric staff meetings. We became convinced that, rather than stimulating them, we were contributing to their anxiety by creating an atmosphere in which they thought they had to know more than was actually expected of them.

Recognizing these needs, we instituted some time ago a weekly group discussion with the students held by a psychiatrist and

a psychologist, and more recently by the nursing supervisor, the chief of nursing service of the hospital, and a psychologist. We were rewarded by evidences of the students' growth, demonstrated by their increasing ability to express some of their feelings and anxieties. Frequently students, after working at other activities, have written us that they considered this experience to be one of the most valuable in their training.

### COUNSELING PROGRAM

When the student begins his training program he is assigned to a psychiatrist on the staff for counseling purposes. If the student was formerly on the staff of this hospital, he is allowed to choose the physician he would like to work with. Students are given appointments for an initial interview; additional appointments are up to the student and the psychiatrist. In some instances students have been introduced to individual psychotherapy, which has lasted throughout their stay at this hospital and has been continued with civilian therapists after the student's release from service. These instances are most encouraging, because when the student realizes he has personal problems to cope with and seeks help with them, he is in a better position to work with patients and with staff members. The nursing instructor acts as an educational counselor as well and assists the students with their anxieties regarding their work. When educational problems become mixed with emotional difficulties, the student is encouraged to discuss these with his therapist.

More recently we have introduced two other teaching methods that have aided considerably in helping the student to take a more active part in the treatment program.

### "BIG BROTHER" PROGRAM

We felt that the student needed to know patients as human beings rather than as disease entities and decided to try assigning each student a patient early in his training. The student preferably first sees the patient on one of the admissions wards and follows him throughout his stay in the hospital. He sees the patient as often as his schedule and own interest will allow with the purpose of getting to know him and finding out all he can about him. Sessions are provided for discussion of the patients, and the students are encouraged to keep notes of their contacts. At the end of the course, they prepare a summary of their impressions of the patients. Several of the patients have made marked improvement, which has served as a most effective demonstration to the student of the real value of relationships in treatment. The student provides the patient with a healthy model to identify with and feels no pressure to "treat" the patient.

At the students' request, we have modified our teaching program to include an hour per day of group discussion held by vari-

ous staff nurses to deal with the daily anxieties aroused in caring for patients. These hours have proved to be extremely rewarding, and a great deal of discussion ensues, often prolonged beyond the assigned time.

Students have chronically complained that they do not feel part of the service, and we have found that we have inadvertently contributed to this feeling by not giving them certain rights and privileges which are accorded even the most inexperienced and untrained staff members. We have taken steps to make the student feel more a part of the psychiatric service by allording him wherever possible the same opportunities as a permanent staff member. We have held seminars twice a week for the entire staff that provide an opportunity for continual growth for everyone as well as indoctrination of new staff members, and that allow as little distinction between student technicians and others as possible. We believe this will contribute greatly to the therapeutic atmosphere of the service as a whole and will result in even better patient care than in the past.

We believe that the success of methods in the newly emerging field of social psychiatry in mental hospitals justifies looking into our traditional teaching and ward management procedures and at this time see two main areas in psychiatric nursing and treatment which should be developed further.

### SOCIAL THERAPY

The idea of the social therapist originated with Dr. Maxwell Jones and his work at the Social Rehabilitation Unit at Belmont Hospital in England. Here, young girls with various backgrounds are taught how to care for psychiatric patients in a relatively short period of time while working as members of the staff. They remain in the unit for only six or eight months and yet achieve a remarkably high degree of therapeutic skill. They attend a series of seminars dealing with normal growth and development given by a permanent staff member and have additional opportunities to learn about interpersonal relations in their daily contacts with patients. Their daily instruction periods enable them to deal with their own anxieties and curiosities when these are most meaningful; thus their training helps them to cope with their own problems while aiding in the treatment process. Their primary role is relating to patients and encouraging them to communicate their feelings to others in order that they may be understood and helped by other staff members and by the other patients. Pressure is thus not exerted on them to interpret psychologic material.<sup>10</sup> This orientation away from interpretation is an extremely important one, as we have pointed out.<sup>11</sup>

## WARD MANAGEMENT

It follows that when free communication is developed and social anxiety is lessened, both patients and the staff feel less pressure, and a truly therapeutic community can emerge. *The degree of behavioral change possible within relatively short periods of time in such an atmosphere is limited only by the abilities of the staff to share in the communication process.* The results of this kind of treatment are evident even in the chronic behavior and character disorders<sup>12</sup> where social rehabilitation is accomplished sometimes in four or five months, in persons with lifelong histories of great maladjustment, as well as in the debilitating neurotic disorders. One frequently hears staff members comment on the "quietness" of their ward or group, as if this were the criterion of successful treatment. Use of sedatives and restraining techniques in the past created a sense of security in the staff but seldom considered the welfare of the patient.

It appears that when communication among members of the staff and between staff and patients is improved, the running of the ward itself becomes therapeutic, as the patient more and more participates in his own treatment. The staff must be able to give up some of their functions without guilt and of necessity have to "unlearn" many aspects of their roles. It is accomplished informally by dealing with anxieties as they arise.

Treatment, as we see it, consists of providing the patient with healthy people as models for his own behavior and of working out means for constant communication of his feelings to others. By healthy people we mean real people—each with his own individuality, anxieties, and interests, but free to express these qualities rather than allow them to interfere in his relationships with others. Communication increases the ability to tolerate others and to relate to them in a realistic manner, thereby decreasing the likelihood of having to act out impulses and feelings. All relationships in the hospital then become potentials for therapy if skill in using them is developed.

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ACKNOWLEDGEMENTS: We would like to thank Capt. Robert R. Deen, MC, USN, Lt. Comdr. Linn Stearns, NC, USN, Lt. Margaret Shaw, NC, USN, Comdr. Myrtle Warner, NC, USN, and Dr. Irving D. Berg for encouragement, advice, and active participation in the program.

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### DENTAL HYGIENE AND SEX

"The real test of a patient's patience is the dental chair. Here a patient, no matter how calm he pretends to be, signals his tension by slight psychomotor movements which the dentist can detect. And, according to a dental survey made, appropriately, by *Dental Survey*, women make better dental patients than men. As a matter of fact they also take better care of their teeth generally. It seems that in pre-adolescence, little boys consider any type of washing—whether in the mouth or behind the ears—a feminine frill. Worse than that, they believe that a defiance of mother's instructions to wash the teeth, is a symbol of manliness. Then through certain psychiatric mechanisms, not to be disclosed in this family periodical, the growing boy carries this low opinion of dental hygiene right into adult life. The adolescent may slick down his hair and clean his fingernails while preparing for a date; but he apparently feels no need for washing in places where the fruit of his industry is not so visible. To the girl, on the other hand, cleanliness and body care seem to be basic virtues. All of which may account for the fact that women are better patients than men. Or are they?"

—EDITORIAL  
in *Journal of Medical Society*  
of New Jersey, p. 443, Sept. 1955

# ACUTE SUPPURATIVE ARTHRITIS OF THE HIP IN CHILDREN

JAMES B. JONES, *Captain, USAF (MC)*  
REGINALD C. RAMSAY, *Captain, USAF (MC)*

**A**CUTE suppurative arthritis is not uncommon, and in any medical facility where a large number of sick children are treated it can be anticipated that a few patients will develop a pyogenic infection of a joint. The pathogenesis is similar to acute hematogenous osteomyelitis, the bacteria being blood borne from some primary focus of infection. The offending organisms are staphylococcus, streptococcus, pneumococcus, *Hemophilus influenzae* bacillus, gonococcus, meningococcus, and occasionally coliform bacteria.<sup>1</sup> Any of the larger joints may be affected, but, except for gonococcal arthritis, as a rule only one of them is involved. With the present widespread use of antibiotic drugs for the treatment of primary infections, such as boils, acute tonsillitis, and otitis media, many cases of acute suppurative arthritis are either prevented or are aborted before clinical recognition is possible. When an acute inflammatory process does involve a joint, it is easily detected by signs of increased local heat, redness, swelling, tenderness, and pain on motion. However, when the hip or spine is involved the clinician must rely on more subtle findings because of the larger amount of surrounding soft tissue.

Suppurative arthritis of the hip, if neglected, has disastrous sequelae. The capitular epiphysis of the femur may be destroyed, and it is common for the hip to become dislocated.<sup>2,3</sup> In other cases the articular cartilage may be destroyed, resulting in either fibrous or bony ankylosis in a position of deformity.<sup>4-6</sup> It is therefore highly desirable that the diagnosis of acute suppurative arthritis of the hip be established early in its course, so that effective therapeutic measures may be instituted before irreversible changes in the joint structures can ensue.<sup>5</sup> The purpose of this article is to discuss methods of early recognition of acute suppurative arthritis of the hip and to present two illustrative cases.

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From U. S. Air Force Hospital, Barksdale Air Force Base, La.

## SIGNS AND SYMPTOMS

The diagnosis should be considered in any child who has a fever, develops a protective limp, and refuses to walk or to move about normally. A history of a preceding febrile illness is common, or the child may still be suffering from an infection. There may be a relationship to trauma, and this is apt to be misleading. Any trauma would direct attention to the painful part but probably does not play a significant role in the pathogenesis. The patient will be irritable and restless, and will cry, especially with any movement. Inasmuch as any motion may be transmitted to the *affected hip joint*, it will be difficult for the parent and for the examiner to ascertain the site of the pain. A child of three years of age or older may be able to indicate the location of his difficulty, but if this is not the case, the physician must rely on careful observation and examination.

The capsule of the hip joint is more relaxed in the flexed, abducted, externally rotated position (the so-called "frog position"). If there is increased fluid within the joint the child will automatically tend to hold his leg in this position (fig. 1A). Any motion which will tighten the capsule and decrease the space will produce increased tension within the joint and accentuate the pain. The most important clinical finding, therefore, is the observation that the child is more comfortable with one hip held toward the frog position. With the hip supported in this position the other joints of the lower extremity can be examined without unduly upsetting the child (fig. 1B). It is especially important to rule out any disease in the knee joint. The simultaneous examination of both hips is most satisfactory (fig. 1C). By grasping the knees, the hips are held in the frog position and gently adducted and extended. Reflex muscular resistance will be detected on the affected side and the child will cry out. An uninvolved hip joint can be moved without resistance and without pain. In addition, it may be noted that *tenderness on palpation* is present over the hip joint.

These findings are indicative of increased fluid or synovial thickening within the hip joint. In children, several conditions can produce these changes. Nonspecific synovitis of the hip is the most frequent differential diagnosis to be considered. With nonspecific synovitis, not a well-understood clinical entity, the child usually does not have a fever, although frequently it occurs following a febrile illness. There is a protective limp and guarding of the hip. The signs and symptoms are not alarming and last for only a few days. One wonders if some of these cases might not be actual abortive bacterial infections.

Identical to nonspecific synovitis is the early stage of Legg-Calvé-Perthes disease, which cannot be definitely diagnosed until roentgenographic changes can be demonstrated in the capit-



Figure 1. (A) Frog position of the right hip. (B) With the hip held in the frog position, the other joints of the lower extremity can be more easily examined. (C) Simultaneous examination of both hips is most satisfactory.

ular epiphysis of the femur.<sup>7</sup> It is for this reason that all cases of nonspecific synovitis should be followed carefully and repeated roentgenographic studies made if there is persistence of any signs or symptoms referable to the hip joint. Tuberculosis, which can simulate an acute pyogenic infection, may be most difficult to rule out, and one must rely on the laboratory for final proof. Also to be considered in the differential diagnosis are rheumatoid arthritis and rheumatic fever.

Roentgenograms of the hips should be obtained in every suspected case. The capsular outline is frequently visible and, if more prominent or bulging on the affected side, is of diagnostic significance. One should also look carefully for the appearance of widening of the joint space (fig. 2). Any osseous involvement may be indicative of an osteomyelitic process.



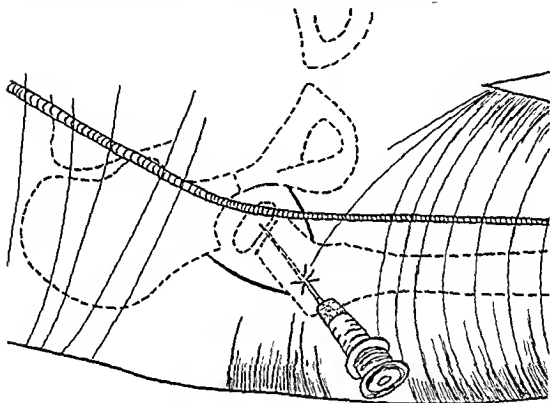
*Figure 2 (case 1). The initial roentgenogram of the hips showed widening of the joint space on the right. This is highly suggestive of increased fluid within the joint. The capsular outline cannot be visualized.*

Routine laboratory studies will usually reveal a polymorphonuclear leukocytosis, although this finding was not present with one of our patients. It is to be expected that the erythrocyte sedimentation rate will be elevated.

#### ASPIRATION OF THE HIP JOINT

Although the diagnosis may be suspected from the foregoing, it cannot be established without aspiration of the hip joint. Not only is aspiration diagnostic, but it also is an all-important therapeutic step. Smear and culture of the joint fluid will prove or disprove the presence of a pyogenic infection, and antibiotic sensitivity studies will guide the physician in his therapeutic program.

Aspiration of the hip joint is not difficult, contrary to common opinion, and when the joint is distended with fluid, is surprisingly easy. The following method is recommended. The skin and subcutaneous tissue lateral to the femoral pulse and parallel to the prominence of the greater trochanter are infiltrated with one of the local anesthetic agents such as procaine hydrochloride or Xylocaine Hydrochloride (brand of lidocaine hydrochloride). A long 20- or 21-gage needle on a syringe filled with the local anesthetic agent is then directed toward the hip joint, keeping in mind that the head of the femur is directly beneath the femoral pulse and that the needle must angle superiorly to correspond to the normal angle produced by the neck of the femur (fig. 3).



*Figure 3. The approach for needle aspiration of the hip joint.*

When the needle encounters the anterior hip capsule, there is increased resistance to its insertion. By injecting small quantities of fluid, it can be determined when the hip joint has been entered. The joint space will accommodate only 1 or 2 ml of fluid, and the fluid will return into the syringe. It must be emphasized that if fluid does not return to the syringe the point of the needle does not lie within the hip joint. Frequently, if there is increased fluid within the hip joint, it will appear in the syringe as soon as the needle pierces the capsule. Before withdrawing the needle, it is wise to inject penicillin solution into the joint if there is any suspicion that a pyogenic infection is present.

All material obtained from the joint should be sent to the bacteriology laboratory for routine smear and culture. Specific ant

biotic sensitivity studies should be made. An immediate smear of the fluid may not only show the presence of pus cells, but may give an indication of the nature of the offending organism. One of the antibiotic drugs should be administered, although the culture and sensitivity studies may suggest changing to another drug at a later date.

It is beyond the scope of this article to discuss in detail the treatment of suppurative arthritis of the hip. However, in our opinion, the infection can be adequately controlled in most cases by specific antibiotic drugs if the diagnosis is established and effective drugs instituted early in the course of the disease. Surgical intervention can be held in abeyance until the efficacy of treatment with antibiotics alone can be determined. Open drainage is not to be condemned but should be used only if truly indicated.

### CASE REPORTS

**Case 1.** A three-week-old male infant was admitted to this hospital because he had had fever, been irritable, and had not moved his right leg for one week. At the time of admission the infant cried constantly, especially on being moved about. Both hips were held flexed and externally rotated in a frog position. There was definite resistance to manipulation of both hips. However, the left could be brought to a more neutral position whereas there was increased resistance to extension of the right hip and the slightest attempt caused him to cry out. There was a one-degree temperature elevation. The white blood cell count on admission was 17,950 per  $\mu$ l with 51 per cent neutrophils and 49 per cent lymphocytes. Roentgenograms of the hips showed the appearance of widening of the joint space on the right (fig. 2).

The day following admission to the hospital the right hip joint was aspirated. One milliliter of purulent fluid was obtained. Before withdrawing the needle, 450 mg (750,000 units) of crystalline penicillin G was injected into the joint space. Immediate smear of the fluid showed the presence of gram-negative intracellular diplococci. Two hundred and ninety-seven milligrams (300,000 units) of procaine penicillin G was administered intramuscularly twice daily for three days and then once daily for eight days. There was an obvious immediate improvement noted following the aspiration, and continued gradual improvement. At the time of discharge, 12 days after admission, the infant was actively moving both his legs and both hips could be brought to a neutral position without resistance.

Since discharge from the hospital the patient has been a healthy, normal appearing infant. Roentgenograms of the hips taken at age six months showed normal development of both hips.

Because of the nature of the infection the mother was examined. Urethral smear disclosed gram-negative intracellular diplococci. Treatment for her infection was therefore instituted.

**Case 2.** A three-year-old girl was admitted to this hospital because of pain in the right lower extremity and a protective limp. Two weeks prior to admission she had had an upper respiratory infection which resolved spontaneously. Her mother stated that four days before admission the child fell, following which she would not use her right leg when walking, and she ran a low-grade fever. The mother believed that the source of her child's difficulty was the right knee.

On admission to the hospital the child had a rectal temperature of 101°F. There was a marked protective limp on the right and the child held her right hip partially flexed and externally rotated. There was tenderness and muscle spasm about the right hip joint, and any attempt to extend and internally rotate the hip caused the patient to cry out with pain. The white blood cell count was 13,200 per  $\mu$ l with 24 per cent neutrophils and 66 per cent lymphocytes.

The initial working diagnosis was synovitis of the right hip with rheumatic fever or rheumatoid arthritis to be excluded. Roentgenograms of the hips were negative. The erythrocyte sedimentation rate was 44 mm per hr, and C-reactive protein was 2 plus. Other laboratory tests, including antistreptolysin titer, blood culture, and an electrocardiogram were within normal limits. Two days after admission to the hospital salicylate therapy was instituted but the patient continued to have a temperature elevation ranging between 100° and 101°F, and no improvement in the hip was noted.

On the sixth hospital day the right hip joint was aspirated and 2 ml of slightly cloudy, straw-colored fluid was obtained. Before withdrawing the needle, 600 mg (1,000,000 units) of crystalline penicillin G was injected into the hip joint. Fifty milligrams of Terramycin (brand of oxytetracycline hydrochloride) was administered intramuscularly three times daily. The day following the aspiration the child's temperature spiked to 102°F and then she became afebrile. There was an immediate improvement in the child's clinical course.

The growth on the culture of the joint fluid was alpha hemolytic streptococcus, which was most sensitive to tetracycline and Chloromycetin (brand of chloramphenicol) and less sensitive to Terramycin and penicillin. Two hundred and fifty milligrams of tetracycline four times daily was given orally and the Terramycin was discontinued.

The patient continued to improve and on the 15th hospital day she was walking with only a slight limp. The tetracycline was continued for two weeks after the child was discharged. Clinical and radiologic findings of the right hip two months later were completely normal.

### SUMMARY

The early recognition of acute suppurative arthritis of the hip is essential to avoid its disastrous sequelae.

The physician should become suspicious of this condition from the history of fever and voluntary protective immobility of the



hip. The patient often will maintain the involved hip in flexion, abduction, and external rotation ("frog position"). Widening of the joint space or bulging of the capsular outline may be noted on routine roentgenograms of the hip.

Nonspecific synovitis, rheumatic fever, rheumatoid arthritis, and tuberculous hip disease must be considered in the differential diagnosis.

The definitive diagnostic procedure in septic arthritis of the hip is aspiration of the hip joint. This should be performed in every suspected case. Bacteriologic examination of the joint fluid may reveal the specific pathogenic organism. Antibiotic sensitivity studies will guide the therapeutic program. The removal of purulent fluid from the joint space and the instillation of an antibiotic agent, such as penicillin, is highly beneficial until specific therapy may be started after completion of sensitivity studies.

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#### VALUE OF PERSEVERANCE

"It is, however, a serious fault in a research worker to be too ready to drop problems as soon as he encounters a difficulty or gets seized by enthusiasm for another line of work. Generally speaking one should make every effort to complete an investigation once it has been started. The worker who repeatedly changes his problem to chase his newest bright idea is usually ineffectual."

—W. I. B. BEVERIDGE

*The Art of Scientific Investigation*,  
W. W. Norton & Co., New York, N. Y.,  
1950. p. 131



## Clinicopathologic Conference

Tripler Army Hospital, APO 438, San Francisco, Calif.\*

### PROGRESSIVE DYSPNEA

**Summary of Clinical History.** A 34-year-old electrician and printer of Portuguese extraction was admitted to the hospital complaining of shortness of breath on exertion for one month.

Except for a marked susceptibility to colds, he said he had been in good health up to three months before admission, when he noted intermittent frontal headaches and some generalized muscle aches lasting for one month, and began to cough up small amounts of greenish sputum. One month before admission he noted dyspnea on exertion, which gradually increased in severity and was associated with some weight loss and fatigability. From onset of symptoms to admission, he had lost about 25 pounds. Two weeks before admission he first noted wheezing over the upper right side of his chest, as well as hoarseness and night sweats. He denied chest or abdominal pain, orthopnea, hemoptysis, chills, allergies, nausea, vomiting, jaundice, diarrhea, dysuria, or ankle edema. His past medical history revealed few of the usual acute childhood infections. He had gonorrhea at the age of 23 and a fractured foot 4 years later. He had been discharged from the Army 5 years before for psychoneurotic symptoms. He had had no medication except for routine treatment of his colds, no tobacco, and just an "occasional" beer.

There was no known exposure to tuberculosis or coccidioidomycosis. Six months before admission the patient had a routine chest roentgenogram taken which he was told was normal.

\*Brig. Gen. John F. Bohlender, MC, USA, Commanding General. From the Laboratory Service, Col. Harold E. Shuey, MC, USA, Chief.

**Physical Examination.** The patient was a well-developed, chronically ill male in no acute distress. His temperature was 99.4°F; pulse, 80; respirations, 26; blood pressure, 126/84 mm Hg. Examination of the eyes, ears, nose, and throat was negative. Examination of the lungs revealed impairment to percussion over both bases anteriorly and posteriorly. The diaphragm moved freely. There was increased fremitus over the right lower chest. Fine inspiratory rales and intermittent wheezes were heard over both bases anteriorly and posteriorly. The heart, abdomen, and neurologic systems were negative on examination.

**Laboratory Studies.** Red blood cells numbered 3.6 million per  $\mu$ l. The hemoglobin measured 10.2 g per 100 ml. There were 10,200 white blood cells per  $\mu$ l with 61 per cent neutrophils, 30 per cent lymphocytes, and 4 per cent eosinophils. The erythrocyte sedimentation rate was 32 mm per hour, corrected (Wintrobe). Blood chemistry studies revealed the following: serum alkaline phosphatase, 10.4 Bodansky units; serum acid phosphatase, 1.5 King and Armstrong units; serum inorganic phosphorus, 4.4 mg per 100 ml; and serum calcium, 11.4 mg per 100 ml. The cephalin-cholesterol flocculation test was negative. Serologic examination of the serum revealed a negative Kahn test and no cold agglutinins. The urinalysis was negative, with no Bence-Jones protein. The sputum was very scanty, and no acid-fast bacilli were found on repeated smears and cultures. Gastric washings were also negative for acid-fast bacilli. Skin tests with coccidioidin and histoplasmin and a PPD (second strength) tuberculin test (on two occasions) were negative. A third tuberculin test was reported as eliciting a 3-plus reaction.

Chest roentgenograms taken on admission revealed "a feathery density in each lower lung field, most marked in the medial areas. The diaphragm is not involved. The heart is not enlarged. In areas the individual densities tend to become confluent, and in the right base the possibility of honeycombing is present. The upper lung fields show no evidence of disease." Films taken two months later on the second admission showed extensive coalescence of the densities so that they became homogeneous, completely filling the lower two thirds of both lung fields from the hilum to the periphery. There was no apparent cardiac enlargement. A gastro-intestinal series and barium enema were nonrevealing.

Except for the roentgenographic findings described above, repeated laboratory tests showed little alteration during the course of the patient's illness. The serum inorganic phosphorus dropped to 3.4 mg per 100 ml. On the day before death, the white blood cell count rose to 39,800 per  $\mu$ l with 92 per cent neutrophils. No pathogenic organisms were grown on repeated cultures.

**Course in Hospital.** On the first admission the patient remained in the hospital for 29 days, when he signed his own release. He received only symptomatic treatment. During this stay he developed no new physical findings or symptoms. At all times inspiratory rales could be heard over both bases. He ran a persistent low-grade fever, never above 100.4°F, and cough and sputum were almost entirely absent.

For a month the patient remained at home. Cough and dyspnea gradually increased; weight loss and fatigue became marked.

The patient was readmitted with severe dyspnea and marked cyanosis of the skin and mucous membranes. The temperature was 99.8°F; pulse, 120; respirations, 40; blood pressure, 124/80 mm Hg. Some clubbing of the fingers and toes was noted. The lungs showed slight dullness to percussion over both bases. Bronchovesicular breath sounds were equal throughout. There was good motion of the diaphragm. The heart was not apparently enlarged. The heart sounds were normal. The liver edge was palpable 4.0 cm below the right costal margin and was slightly tender. There were no palpably enlarged lymph nodes. The rest of the examination was essentially negative.

Since the nature of the patient's disease was not established, treatment was symptomatic. He was given penicillin and streptomycin sulfate. Despite high oxygen concentration by tent and mask, he showed marked cyanosis and dyspnea on the slightest exertion. He suffered severe aching pains across the front of the chest which were relieved by Demerol (brand of meperidine hydrochloride). No fluid was obtained at the time of a right thoracentesis attempted shortly before death. Death came quietly 73 days after the first admission.

#### DISCUSSION

**Doctor Pitts:**\* This discussion deals with a 34-year-old male who developed a relentlessly progressive illness characterized by pulmonary insufficiency, with death 8½ months following a report of a normal chest x-ray, 5½ months after the onset of symptoms, and 3½ months subsequent to the onset of dyspnea. Associated symptoms consisted of a low-grade cough with constitutional manifestations of low-grade fever, considerable weight loss, and progressive debility. Objective findings revealed bilateral diffuse pulmonary involvement which appeared patchy and symmetrical without hilar adenopathy on the initial chest roentgenogram. Cyanosis at rest or on the slightest exertion, refractory to oxygen therapy during the latter part of his clinical course, suggested an alveolar-capillary block in the absence of evidence compatible with a venous-arterial shunt. Laboratory findings of mild anemia and an elevated serum globulin are considered nonspecific.

\*Maj. Forrest W. Pitts, MC, USA, Department of Medicine.

The clinical manifestations were not those of acute or chronic parenchymal suppuration or bronchiectasis, and I believe these entities may be readily excluded without further discussion. Nor does this case fit the pattern of infection due to viral or rickettsial agents. Fungus diseases such as coccidioidomycosis, histoplasmosis, and blastomycosis may appear as diffuse bilateral progressive pulmonary disease, and negative skin tests are the rule rather than the exception in the disseminated and progressively fatal forms. At this point in the discussion, serologic studies do not discourage their elimination on the basis of negative cultures, lack of extra-pulmonary involvement, and subsequent death due to asphyxia. The tuberculin conversion is difficult to explain but this finding does not fulfill the usual significance attributed to it when an attempt is made to correlate it with other key features. The only plausible explanation for an individual to die of tuberculosis with extensive pulmonary involvement, repeatedly negative cultures for *Mycobacterium tuberculosis*, and clinical manifestations of an alveolar-capillary block is that associated with the miliary form of this disease; the latter is readily excluded by the appearance and distributions of the lesions on the chest roentgenogram (fig. 1).

Other causes to be considered are obscure diffuse bilateral pulmonary diseases, including pulmonary infiltration with eosinophilia, pneumoconiosis, lipoid pneumonia, lymphoma, uremia, and histiocytosis or lipogranulomatosis. These may be excluded because of the absence of expected associated findings and/or the less savage clinical course usually associated with these diseases.

Pulmonary adenomatosis (alveolar cell carcinoma, bronchiolar carcinoma) produces diffuse bilateral pulmonary lesions and an asphyxial type of death, but this condition usually runs a much more protracted course and is characterized by large quantities of clear mucoid sputum of low viscosity.

Diseases commonly associated with alveolar capillary block such as pulmonary arteriosclerosis, repeated multiple thromboses or embolization with infarctions of the pulmonary vascular bed, leukemia, sarcoidosis, beryllium granulomatosis, lymphangitic metastases, chemical pneumonia similar to that noted following inhalation of sulfur dioxide fumes, certain collagen diseases, and the type of diffuse interstitial pulmonary fibrosis described by Hamman and Rich<sup>1</sup> provide a more fruitful but difficult group to narrow down in the differential diagnosis. Cor pulmonale is common during the late stages of most of these entities, and I suspect the pathologist will find hypertrophy and dilatation of the right ventricle in this case, although little or nothing is stated in the protocol with reference to an electrocardiogram, cardiac fluoroscopy or evaluation of the cardiac silhouette in the lateral or oblique views, the presence or absence of distended neck veins, and dependent edema. Enlargement of the liver during the second hospitalization seems to be the only recorded manifestation of right ventricular failure.



*Figure 1. Roentgenogram of the chest showing bilateral feathery densities in the medial portions of the lower lung fields.*

The rapid downhill course, low-grade fever, x-ray appearance of the lesions, and lack of polycythemia lead me to exclude pulmonary arteriosclerosis. Repeated small thromboses or infarctions of the pulmonary vascular bed remain a possibility and cannot be excluded with certainty.

As an electrician, the patient may have been exposed to beryllium through contact with (now obsolete) broken fluorescent light tubes. This point in the history would be extremely important if positive, since all the features of his illness are compatible with such a diagnosis. Interestingly enough, a negative history would not exclude beryllium granulomatosis in the light of reported "neighborhood cases." However, lack of x-ray evidence of upper lobe involvement and absence

of a miliary type of lesion militates against this diagnosis as the most likely cause. Occupational exposure to sulfur dioxide gas as used in old refrigerators remains a less likely possibility and can be excluded reasonably well.

On the day prior to death, the white blood cell count was reported as 39,800 per  $\mu$ l with 92 per cent neutrophils. I prefer to attribute this to an agonal leukemoid reaction rather than to myelogenous leukemia. It is difficult to conceive of a respiratory type of death from leukemia, particularly so in the absence of more severe anemia, retinal hemorrhages, and splenomegaly.

Could this be an unusual case of sarcoidosis? All of the key findings—diffuse bilateral pulmonary disease, low-grade cough and fever, alveolar capillary block, elevated serum globulin, and hepatomegaly from cor pulmonale and/or hepatic involvement—are in keeping with sarcoid. Occasionally sarcoid runs a progressive, fatal course, but for death to occur within such a brief span of time makes this possibility seem improbable. Lack of hilar or extrathoracic adenopathy and/or clear-cut involvement of other tissues or organ systems also rules heavily against sarcoid as the most likely diagnosis.

Carcinomatous lymphangitic metastases to the lung from an occult primary lesion such as that which may occur in the body or tail of the pancreas, the stomach, or the bronchus would account for all of the findings in the protocol and cannot be excluded from the final differential diagnosis with complete certainty. The x-ray appearance is not that of the "sunburst" pattern, and this factor lends considerable weight against this possibility.

Of the collagen diseases, scleroderma most frequently produces an alveolar-capillary type of block. The absence of cutaneous findings and other features readily leads one to exclude the possibility of scleroderma. Periarthritis nodosa may involve the medium-sized vessels of the lungs, subsequently producing an alveolar-capillary type of block and occasionally leading to destructive lesions in the lungs characterized by cavitation. Hypersensitivity angiitis characteristically involves the small vessels of both arteries and veins and runs a more acute course. It is not characterized by necrotizing granulomata. Hypersensitivity angiitis is usually associated with a generalized vasculitis and frequently terminates fatally from diffuse vascular involvement of uremia. A specific subtype of collagen disease was described in 1931 by Klinger<sup>1</sup> and formulated by Wegener<sup>2</sup> in 1939. This is characterized by necrotizing granulomatous lesions in the upper air passages or in the lung, as well as renal changes manifested by necrosis and thrombosis of loops or lobes of the glomerular capillary tuft. In addition, there is generalized vasculitis. In reviewing the literature to 1954, Fahey<sup>4</sup> found 22 cases of Wegener's granulomatosis in the literature and added seven cases of his own. Absence of both renal

involvement and diffuse organ or system involvement in this case tends to rule against a collagen type of disease such as hypersensitivity angitis or Wegener's granulomatosis.

In 1944 Hamman and Rich from Johns Hopkins described four cases of acute diffuse interstitial fibrosis of the lungs of undetermined cause observed from 1931 to 1943. All cases were characterized by cough, progressive dyspnea, cyanosis, and cor pulmonale. Autopsy revealed interstitial edema and hemorrhage with few leukocytes, and enlargement of the lining alveolar cells as well as necrosis of the alveolar and bronchiolar epithelium; a hyaline membrane was noted to line the alveoli, and bacteria were absent. None had vascular lesions similar to periarteritis nodosa. The most striking feature was a progressive, extensive, diffuse interstitial proliferation of fibrous tissue throughout all portions of both lung fields. The early stage was characterized by fibroblasts, and the late stages showed mature scar tissue. Survival times from the onset of symptoms varied from one to six months. The histories of Hamman and Rich's original cases are almost identical to that of the present protocol. Since the original description, a total of 27 cases had been recorded at the time Peabody and Peabody<sup>3</sup> wrote an editorial on this condition in December 1954. Eighteen of the 27 cases have been reported since 1950.

The cause of the Hamman-Rich type of diffuse interstitial pulmonary fibrosis is unknown. Suggested causes have ranged from recurrent episodes of viral pneumonia, chemical irritants and hypersensitivity, to a disturbance of fibrinolysis. Pathologic changes similar to the Hamman-Rich type of involvement have been reported with five fatal cases of interstitial pneumonia which occurred while the patients were receiving prolonged Apresoline (brand of hydralazine hydrochloride) and hexamethonium therapy. Characteristically, all cases have been resistant to therapy. Initially, it was believed that duration of life was limited to weeks or months. There are now two patients who have survived three years and a third reported in 1949 to have survived 13 years after the onset of symptoms. Corticotropin and cortisone had been used empirically with equivocal effect. One striking case demonstrated a remission coincident with the onset of administration of these agents and followed by a severe exacerbation when they were discontinued. Most authorities agree that once steroids are started they should be continued for life.

Although it is difficult to pick out any single diagnosis with certainty, I believe the over-all features of this case best fit a diagnosis of the Hamman-Rich type of diffuse interstitial pulmonary fibrosis.

Doctor Bratenahl: Before presenting the pathologic findings, I would like to know what further comments any of you would like to make regarding this case; in particular, any more guesses as to the most probable diagnosis. Would anyone care to comment further on the x-ray

\*Comdr. Charles G. Bratenahl, MC, USN, Naval Medical Unit, Laboratory Service.



picture (fig. 1) in this case, correlating it with the history? Might anything significant be added to the x-ray description?

**Doctor Blemley:**\* I have nothing to add to the description of the x-ray findings as given in the protocol. While beryllium poisoning has to be thought of, the patient having been an electrician, most cases of beryllium poisoning occur in factory workers making fluorescent bulbs. The roentgenographic finding in acute cases consists of widespread fine nodular infiltrations in the lung fields. With continued exposure this can go on to the chronic form of poisoning within three to four months, characterized by large granulomatous infiltrations in the lungs. Also related to his occupation as an electrician is the possibility of chemical pneumonitis by inhalation of hydrogen chloride, as electricians commonly use hydrochloric acid to clean electrical connections prior to soldering. Symptoms resulting from such exposure are headaches, substernal pains, dyspnea, and marked cyanosis—symptoms which this patient demonstrated.

**Doctor Gangerosa:**\*\* Boeck's sarcoid is at times associated with pulmonary fibrosis and active tuberculosis terminally. The latter is manifest clinically by a reversion of the tuberculin skin test from negative to positive as seen in this case. This reversion has diagnostic import, I feel. Some believe that repeated skin testing with tuberculo-protein in a tuberculin-negative individual will induce a tuberculin reaction, but Raffel<sup>3</sup> has shown that it is the waxy component, the lipid fraction of the tubercle bacillus, which is necessary in combination with tuberculo-protein to induce the tuberculin reaction. I, therefore, submit a diagnosis of Boeck's sarcoid with pulmonary fibrosis and active tuberculosis terminally.

#### Clinical diagnoses:

Undiagnosed condition manifested by bilateral pulmonary infiltrations suggestive of pulmonary adenomatosis

#### Dr. Pitts' diagnoses:

1. Hamman-Rich diffuse interstitial fibrosis of the lungs of undetermined cause
2. Terminal leukemoid reaction of the blood

#### Dr. Gangerosa's diagnoses:

1. Boeck's sarcoid, with pulmonary fibrosis
2. Active tuberculosis

#### PATHOLOGIC FINDINGS

**Doctor Brotenahl:** At autopsy the patient was a markedly emaciated 34-year-old Caucasian man. The skeletal muscles were atrophic, and there was marked lack of subcutaneous fat. Moderate clubbing of digits was noted. The heart weighed 350 grams, and the right ventricle was moderately dilated. There were 200 ml of pericardial fluid present. The heart valves were essentially normal.

\*Maj. Nelson Blemley, MC, USA, Assistant Chief, Radiology Service.

\*\*Capt. Eugene J. Gangerosa, MC, USA, Intern, Obstetrics and Gynecology Service.

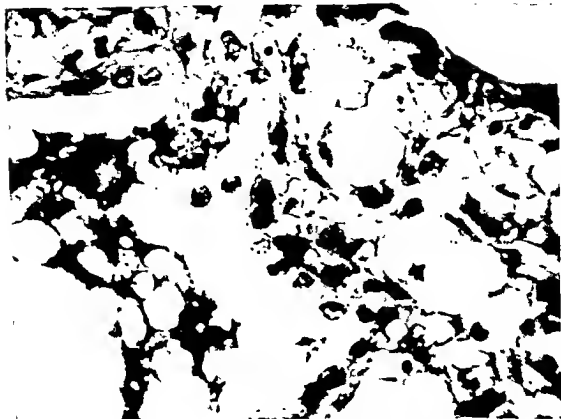
The principal findings were confined to the lungs. The right weighed 1,710 grams, the left 1,600 grams. With sterile precautions, cultures of the right lung revealed *Pseudomonas aeruginosa*. There was no pleural effusion, but fresh fibrinous adhesions covered the pleura on both sides (fig. 2). Some fibrinous adhesions were noted at the left apex. The lungs appeared heavy and solid with no crepitation at all. They had a consistency almost like liver. Cut sections revealed almost homogeneous, light gray-white, rather solid lung tissue in all lobes, particularly solid in the lower lobes (fig. 3). There was no particular odor about the tissues. On slight pressure a thick, yellowish, opaque fluid oozed from the cut surface. This material was smooth and non-granular. On dropping the lung tissues into Formalin (brand of formaldehyde solution), it was noted that this material floated to the surface as oil droplets. Oil droplets were also noted in the bloody fluid remaining in the posterior thorax after removal of the lungs.

The bronchi were mostly filled with a thick, creamy material similar to that found on compressing the lungs. Some of this material was also found in the trachea. At the apex of the left lung, a red, soft area 5 cm in diameter was found containing semiliquid necrotic material and resembling a poorly walled-off abscess. Although in general the pulmonary lobular markings and other architecture of the lungs were well preserved, no definitely aerated tissue was demonstrable on gross examination. The tracheobronchial and paratracheal lymph nodes were enlarged up to 3.0 cm in diameter (fig. 2). On cut section, they appeared homogeneous and gray-white.

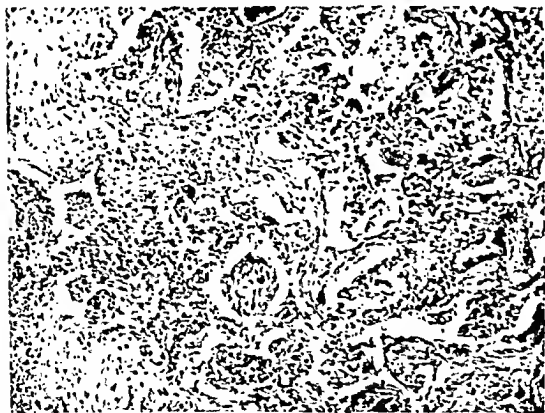
Microscopic sections of the lungs showed a heavy, acellular, fibrinous exudate on the pleura associated with some congestion. Innumerable large macrophages with foamy cytoplasm were found in the septae as well as filling many of the alveoli (fig. 4). Numerous young fibroblasts were also noted in the alveolar septae and proliferating within the alveoli (fig. 5). The alveoli in many areas had a cuboidal epithelial-cell type of lining (fig. 6). The lungs appeared very dense on all sections. Section from the left upper lobe in the area grossly suggesting an abscess showed considerable fibrosis but no distinct abscess. On hematoxylin-eosin sections, many of the alveoli were filled with a basophilic-staining, granular, amorphous precipitate in which were numerous small and large vacuoles (fig. 6). Frozen sections of lung stained with Sudan IV showed intensely red-staining oil droplets in these vacuoles and within the macrophages in the alveoli and alveolar septae. This fatty material did not stain with osmic acid and was not doubly refractile. Occasional conglomerate masses of reticulo-endothelial cells were noted in the alveoli, vaguely simulating giant cells; however, no true multinucleated foreign body giant cells were found. Sections of peribronchial lymph nodes showed the sinusoids crowded with fat-filled macrophages, which stained positively with Sudan IV and negatively with osmic acid.



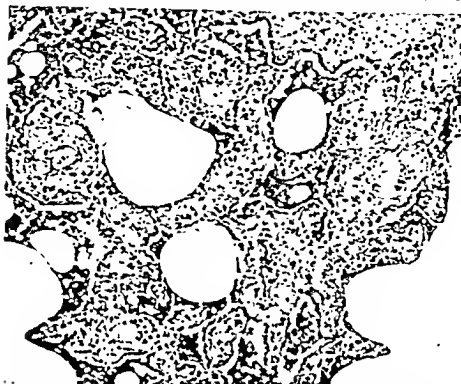
Figure 2. Medial aspect of left lung showing fibrinous pleural reaction and enlarged gray-white hilar lymph nodes. Figure 3. Left lung in cut section showing uniform gray-white consolidation throughout.



*Figure 4. High power photomicrograph of lung showing vacuolated macrophages in alveoli and thickened alveolar walls. ( $\times 400$ )*



*Figure 5. Photomicrograph of section of lung showing diffuse fibrosis of alveolar walls with lipophages and proliferating fibroblast tissue in the alveoli. ( $\times 80$ )*



*Figure 6. Photomicrograph of lung showing fibrous thickening of alveolar walls with large numbers of lipophages in the walls and alveoli, basophilic material and large and small vacuoles, and dissolved oil droplets in the alveoli. Some of the alveoli are lined by cuboidal epithelium probably derived from the bronchioles. ( $\times 80$ )*

Shortly before this patient's death it was learned that, for a long unknown period of time before his first hospitalization, he had used large quantities of oily nose drops and possibly an oil-containing nose spray for his repeated head colds. He denied using any of this material after his initial admission and up to the time of his death.

The staining reaction of the fatty material found within the lungs in large quantities, positive for Sudan IV and negative for osmic acid, is consistent with mineral oil (liquid petrolatum) in contrast with vegetable and animal oils.<sup>7</sup> Some caution in strict interpretation is necessary as the Sudan IV stain is not entirely specific for mineral oil.<sup>8</sup> The pathologic findings of diffuse pulmonary fibrosis associated with large numbers of lipophages in the alveoli and interalveolar septi and the general lack of specific foreign body or inflammatory reaction are consistent with findings reported in previous cases of lipoid pneumonia due to mineral oil.

Vegetable oils, such as Lipiodol (brand of iodized poppy seed oil), sesame oil, or olive oil, usually result in little reaction of the lung tissues. These oils are slowly absorbed with little residual fibrosis. Animal oils, such as cod liver oil or halibut oil, usually cause a much

more acute reaction associated with marked fibrosis and rather striking giant cell formation in a few days. The latter type of lipid pneumonia occurs mostly in infants, and there is usually a history of attempting to force a sick child to swallow cod liver oil against his will, possibly by holding his nose. If his reflexes are weak from illness, he tends to gag and aspirate considerable oily material. Although the reaction is quite severe, it is frequently self-limited.

Lipoid pneumonia resulting from liquid petrolatum is more often found in adults, usually elderly, and as a result of using oily nose drops. Characteristic pathologic findings consist of lipophages in the alveoli and alveolar walls surrounded by a fibrous reticulum, filling much of the air spaces and tending to concentrate in the bases of the lungs posteriorly. The elderly patient has usually employed the oily nose drops or sprays over a long period of time. When x-rays show a picture suggesting a low-grade bronchopneumonia in the bases that does not resolve and that is associated with almost no symptoms, the possibility of lipid pneumonia should be considered. Death usually results from a secondary infection, and the diagnosis is rarely made before death. The sputum may occasionally show lipophages, but this finding is not very helpful since they may be found in various other conditions. The lungs usually appear yellowish and solid, and usually there is an absence of pleural exudate or adhesions. The fibrinous pleural exudate present in this case and the high globulin and alkaline phosphatase values reported here are puzzling features not completely explained. Are there any other questions?

Doctor Pulaski:\* I believe some of you may be interested in a case very similar to the one presented in this Clinicopathologic Conference. It was reported by Stanley<sup>9</sup> in 1947. This was a case of pyocyaneus pneumonitis associated with lipid pneumonia in a 73-year-old Caucasian man. He had suffered with recurrent sinusitis over a period of 16 years, and it was believed that the lipid pneumonia resulted from his use of oily nose drops. In his case the pyocyaneus pneumonitis was much more extensive and the lipid pneumonia much less so than in our present case. He died on the sixth day after admission. Since primary pneumonitis due to *Bacillus pyocyaneus* is a relatively rare occurrence, the interesting thought occurs as to a possible relationship between the lipid pneumonia and pyocyaneus pneumonitis.

#### Pathologic diagnoses:

1. Lipoid pneumonia, secondary to the use of oily nose drops
2. Terminal pneumonitis, due to *Pseudomonas aeruginosa*

\*Lt. Col. Edwin J. Pulaski, MC, USA, Assistant Chief, Department of Surgery.

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#### ON DROWNING

"If a victim has flooded his lungs with fresh water and yet has been successfully resuscitated then it would appear certain that he would be suffering from plethora, haemodilution, electrolyte disturbance, and pulmonary oedema. Further, he would be in danger of severe renal damage from the presence of freely circulating haemoglobin. Substitution bleeding with electrolyte correction, treatment for acute kidney damage, and oxygen therapy for pulmonary oedema and lung flooding would seem to be indicated. Hypotonic saline and oxygen therapy may be of help in those saved from salt-water drowning. The almost complete absence of any clinical reports of patients requiring and receiving such treatment in the vast medical literature of today can hardly be due to a deliberate silence on this subject, and it is difficult to avoid the sinister interpretation that such syndromes probably do not exist and that the aspiration of any marked quantity of water into the lungs is fatal."

—K. W. DONALD, M. D.  
in *British Medical Journal*,  
p. 157, July 16, 1955

## MILITARY OTOTOLOGY AND AVIATION MEDICINE

FRANK A. PERRI, *Lieutenant Colonel, USAF (MC)*

**D**URING 15 years as a physician with the Air Force, I have been impressed by the number of medical officers who are not fully aware of the important and close association of ear disease with military aviation medicine. Perhaps this is because many otolaryngologists are not flight surgeons and many flight surgeons have not made a special study of otolaryngology.

Both groups are faced repeatedly with otologic conditions that require immediate therapy in order to maintain trained crew personnel at peak performance. Many an otologic problem even seems to mean the end of the flying career of a highly proficient pilot, when in reality it is an easily repairable defect that should be only temporarily incapacitating. Conversely, there are minor conditions which can become irreversible and may well end a flying career if proper precautionary steps are not initiated immediately. Into another class fall the seemingly harmless diseases of the ears, nose, and throat which require that immediate steps be taken to remove crew members from flying status for the safety of all concerned.

### BAROTITIS MEDIA

Barotitis media (aero-otitis media) is an acute inflammation of the mucosa of the middle ear caused by trauma to the mucosa from inequality of pressure in the middle ear and external auditory canal. If left untreated, the disease may progress to serious complications. Because of negative pressure in the middle ear, the blood vessels undergo rapid dilatation. Failure to ventilate the middle ear at this stage further results in an intense congestion of the tympanic membrane and an actual ecchymosis of the membrane and middle ear cavity. The membrane often ruptures when the pressure in the middle ear is rapidly reduced while the eustachian tube is closed. Prolonged negative pressure in the middle ear produces transudation of a yellow serosanguineous fluid into the middle ear cavity and the mastoid air cells. This transudate then becomes infected, leading in various cases to acute suppurative otitis media, acute or chronic suppurative or nonsuppurative mastoiditis, acute or chronic eustachian salpingitis, or destruction of the tympanic membrane with loss of hearing in the involved

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From U. S. Air Force Hospital, Sampson Air Force Base, Geneva, N. Y. Col. Perri is now assigned to U. S. Air Force Hospital, Chanute Air Force Base, Rantoul, Ill.



ear. In clinical practice, all of these conditions have been seen as a result of untreated or insufficiently treated barotitis media.

The prevention of complications and the maintenance of crew personnel in constant flying readiness depends upon immediate and proper therapy. Crew personnel should be instructed in the early recognition of this condition, and should adopt prophylactic measures, as follows:

1. In the presence of acute inflammatory conditions of the upper respiratory tract, no matter how mild, crew personnel should not be permitted to fly.

2. When descending from high altitudes, the oxygen mask should be removed at altitudes of less than 10,000 feet. Personnel who have been breathing pure oxygen at high altitudes for a considerable period may develop ear distress from two to six hours after descent, particularly if oxygen is breathed until ground level is reached. This is caused by absorption of oxygen from the middle ear in the presence of eustachian tube obstruction.

3. Upon the onset of barotitis media during flight, ascent to a higher altitude should be made immediately, followed by a slow descent while attempting the Valsalva maneuver.

4. If the condition persists, crew personnel should report to the unit surgeon immediately after landing.

**Diagnosis.** When the condition has progressed until the middle ear is filled with fluid, diagnosis and therapy become major problems. The diagnosis can be made upon the history, by inspection of the tympanic membrane, and by insufflation of the middle ear if required. In the history, the patient will usually mention one or all of the following symptoms: loss of hearing or muffled hearing, fullness in affected ear, "water in ear," and tinnitus. The examiner usually sees a slight retraction and yellowish tinting of the tympanic membrane, with redness at the periphery of the membrane and along the handle of the malleus. A fluid level and/or bubbles of air may appear in the middle ear cavity. If the whole middle ear is filled with transudate, no fluid level will be seen and the middle ear must be insufflated in order to view air bubbles and establish the diagnosis.

**Therapy.** When transudate is not present, therapy consists of reducing congestion and pressure differences between the middle ear and the atmosphere. The first is done by applying a copious spray of a one-quarter of one per cent solution of Neo-Synephrine Hydrochloride (brand of phenylephrine hydrochloride) to the mucosa of each nasal fossa. A cotton-tipped metal applicator soaked in a 5 per cent solution of cocaine hydrochloride is applied to the orifice of the eustachian tube on the affected side for five minutes.

A eustachian tube cannula is then placed at the orifice of the tube, and air is introduced at a pressure of from 3 to 4 pounds. The Toynbee diagnostic tube that connects the ear of the patient to the ear of the flight surgeon indicates the instant that air reaches the middle ear, restoring its normal physiology.

When transudate is present, it must first be aspirated. A 3-inch-long, 22-gauge spinal needle with a short bevel, attached to a tuberculin syringe, is introduced into the middle ear through the most inferior posterior portion of the tympanic membrane, and the fluid is aspirated slowly. No anesthesia is required, as very little discomfort is experienced. The nasal mucosa is then constricted, the orifice of the eustachian tube cocaineized, and the middle ear insufflated as previously described, in order to remove any remaining transudate. This therapeutic procedure reduces the period of convalescence from 21 to 5 days. The perforation of the tympanic membrane is completely healed within 48 hours, and seldom is there a recurrence of the transudate after the pressure on both sides of the tympanic membrane has been equalized.<sup>1</sup>

#### TRAUMATIC CENTRAL PERFORATIONS OF TYMPANIC MEMBRANE

Central perforations of the tympanic membrane are distinguished from peripheral by the fact that the whole rim of the perforation is within the tissue substance of the membrane, inferior to Shrapnell's membrane, and not in contact with the bony annulus tympanicus. This type of perforation occurs in crew members during rapid descent in flight or in altitude chambers, and during and after acute infections of the nose and throat.

That traumatic central perforations do persist and often resist nature's efforts to heal them is all too manifest in the practice of clinical otology, but with adequate therapy, this need not occur. There also is no dispute that certain central perforations do produce a loss of hearing and subject the middle ear to a chronic suppurative infection followed by more severe complications; however, Adams<sup>2</sup> reported a series of cases in which there was successful healing of these perforations along with eventual return of hearing in the affected ear as proved by audiometric study.

If the examining physician finds that a central perforation of the tympanic membrane has not initiated its own healing process within 48 hours following trauma, the flight surgeon should then take the proper measures to close the perforation.

**Therapy.** The following therapy, which has proved successful in a number of our cases, is performed on an outpatient basis while the crew member is on a nonflying duty status:

After bilateral audiometric study, the whole rim of the perforation, plus a small portion of the outer surface adjacent to the rim, is touched with a small amount of very compact absorbent cotton that has been placed on the end of a copper applicator and moistened at the tip with 50 per cent trichloroacetic acid. This is repeated twice weekly, depending upon the membrane response, for at least eight weeks. In many instances there will be a rapid response to therapy, in which case the strength of the trichloroacetic acid is decreased and the solution applied only once each week. A second audiometric study is made after the perforation has healed.

### BAROSINUSITIS

The paranasal sinuses present a condition in flight similar to that of the middle ear, except that their orifices, when not closed by mucosal congestion, are fully patent and rigid at all times. Mucosal congestion will prevent an exchange of air and pressure between the paranasal sinuses and nasal fossa during descent from altitude, with the result that pain in a sinus will be experienced because of the pressure inequality. Transudation and secondary infection may follow.

The flight surgeon can alleviate the discomfort and pain of barosinusitis by inserting a pledget of absorbent cotton soaked in 0.25 per cent Neo-Synephrine hydrochloride in and around the middle meatus. The pledget is left in place for five minutes. If the condition is not relieved after this period, the procedure is repeated. After the second application, it will be noted that the nasal mucosa has reached maximum vasoconstriction, both nasal airways are patent, and the pain and discomfort have disappeared because the nasal pressure is atmospheric. A roentgenographic study is made in order to rule out pathologic conditions of the sinuses. The patient is then placed on a solution of 0.25 per cent Neo-Synephrine hydrochloride solution and instructed to use 10 drops of the solution in each nostril while in the head-low (Proetz) position.

### SUMMARY

The important role of ear disease in aviation medicine has not been sufficiently emphasized. Proper care and disposition of many aviation patients depend on thorough knowledge of diagnostic criteria, treatment, and prognosis of ear disorders.

Barotitis media may be diagnosed from the history, from inspection of the tympanic membrane, and by insufflation of the middle ear if necessary. If there is no transudate in the middle ear, therapy consists of reducing congestion at the nasal end of the eustachian tube and equalizing the pressure on the two sides of the tympanic membrane. If a transudate is present, these measures must be preceded by aspiration. If inadequately treated, barotitis may result in permanent hearing loss.

Traumatic central perforation of the tympanic membrane in my experience has healed most rapidly if treated with topical applications of 50 per cent trichloroacetic acid.

The paranasal sinuses may react to pressure changes in a manner similar to the middle ear, if their orifices are blocked by mucosal congestion. Barosinusitis responds well to treatment with topical vasoconstrictors.

These three seemingly minor otolaryngologic conditions may attain extreme importance when they occur in flying personnel. When not treated promptly and adequately, they cause the loss of highly trained personnel.

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#### THE PHYSICIAN AS AN INDIVIDUAL

"It is axiomatic that treatment must be individual and will vary from patient to patient. But what is true of the patient is also true of the doctor. The resourceful physician presumably will not attempt to follow unquestioningly any fixed school of teaching. Medical education does not standardize the personality of the doctor. Each will and should have his own manner of dealing with patients, developing a flexible psychotherapeutic technique best suited to his own nature."

—C. B. FARRAR, M. D.  
in *Canadian Medical Association  
Journal*, p. 256, Feb. 15, 1956

# DENTAL EXAMINATIONS OF 8,139 ARMY RECRUITS

## Preliminary Report

ROBERT W. HOBSON, *Lieutenant Colonel, DC, USA*

**P**ERIODICALLY, members of the U. S. Army Dental Corps have been asked by various organizations for information concerning the dental status of Army recruits. Prior to this study no compilation of information was available on which to base an adequate reply.

### METHOD

Examinations were conducted in all of the six Army Areas during the months of April and May 1955. Every third enlisted man within the category of recruit or sophomore who reported to the dental clinic was examined. By distributing the examination points throughout the United States and by examining every third individual within the specified time, sufficient randomness was obtained to give the results validity.

For the purpose of this study, a recruit was defined as "an inducted or enlisted man without prior military service." A sophomore was defined as "an enlisted man who has completed not less than 20 and not more than 24 months of service."

Although the examination form used (fig. 1) admittedly has its limitations, it was considered desirable to employ a form from which all information could be transcribed to a single IBM punch card. The fact that spaces for recording are limited on such a card imposed a limitation on the number of questions that could be answered. Under part 8b, the clinical examination was to include bite-wing roentgenograms. In part 12 (prosthetics), the extractions needed as well as missing teeth and unserviceable dentures were to be reflected under the column headed "needed." The numbers in the columns in this part were for coding purposes only, and were to be disregarded by the examining officer.

This preliminary report includes only the recruits examined. No analysis has been made of the geographic distribution of this

group of individuals, or of their dental classification. The information derived from those two parts of the study will be reported at a later date.

DENTAL EXAMINATION FOR STUDY OF DENTAL REQUIREMENTS															REPORTS CONTROL SERVICE MED-DET-122																																																																										
1. FROM (Name of Station)															2. DETERMINATION OF (Check one) a. <input type="checkbox"/> INSPECTEE OF ENLISTEES b. <input type="checkbox"/> SEPARATEES																																																																										
3. LAST NAME - FIRST NAME - MIDDLE INITIAL										4. SERVICE NUMBER					5. AGE (Last birthday)		6. RACE (Check one) <input type="checkbox"/> WHITE 121 <input type="checkbox"/> NEGRO 124 <input type="checkbox"/> OTHER 131																																																																								
7. STATE FROM WHICH ENTERED SERVICE (Check X)																																																																																									
111	112	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127	128	129	130	131	132	133	134	135	136	137	138	139	140	141	142	143	144	145	146	147	148	149	150	151	152	153	154	155	156	157	158	159	160	161	162	163	164	165	166	167	168	169	170	171	172	173	174	175	176	177	178	179	180	181	182	183	184	185	186	187	188	189	190	191	192	193	194	195	196	197	198	199	200
8. DENTAL CLASSIFICATION															9. ON DENTAL EXAMINATION - CLASS (Check one) <input type="checkbox"/> 1 <input type="checkbox"/> 11 <input type="checkbox"/> 111 <input type="checkbox"/> 1111 <input type="checkbox"/> 11111																																																																										
10. MISSING TEETH															11. EXTRACTIONS NEEDED																																																																										
LOCATION															LOCATION																																																																										
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12. FILLINGS															13. PROSTHETICS																																																																										
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PRESENT															SERVICABLE																																																																										
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14. BRIDGES (Number)															15. CONTACTS (Number)																																																																										
16. CROWN (Number)															17. PERIODONTITIS (Check one) <input type="checkbox"/> NONE 151 <input type="checkbox"/> SLIGHT 152 <input type="checkbox"/> MODERATE 153 <input type="checkbox"/> SEVERE 154																																																																										
18. PERIODONTITIS NEEDED (Check one) <input type="checkbox"/> NO 151 <input type="checkbox"/> YES 152															19. REMARKS																																																																										

DA FORM 112-118 8-253 (One Time)

GPO 287200

Figure 1. Examination form for dental evaluation.

## RESULTS

Of the 8,139 recruits examined (table 1), 7,889, or 97 per cent, were in the group aged 17 through 26 years. It is this age group that is of most interest, because selective service at present

draws mainly from the group aged 18 through 26. From table 1 it can be determined that the 7,889 recruits aged 17 to 26 years required 38,137 restorations involving 57,267 surfaces, or an average per man of 4.8 restorations involving 7.3 surfaces.

TABLE 1. *Restorations needed by 8,139 recruits*

Age	Number of recruits	Number of restorations needed	Number of surfaces	Average number of restorations needed	Average number of surfaces involved
16	4	20	24	5	6
17	879	5,446	7,642	6.20	10.15
18	1,410	7,119	10,688	5.05	7.25
19	1,604	7,022	11,229	4.88	7.64
20	1,442	7,225	11,118	5.01	7.75
21	985	4,906	7,137	4.98	7.28
22	486	2,187	3,249	4.50	6.72
23	372	1,388	2,038	3.73	5.50
24	286	1,160	1,711	4.06	6.01
25	247	983	1,423	3.98	5.79
26	178	681	1,006	3.83	5.67
27	92	314	455	3.41	5.01
28	78	313	460	4.01	5.77
29	39	122	163	2.82	3.95
30-48	37	131	200	3.54	5.41
Total	8,139	39,017	58,543	4.8	7.2

In the assessment of defective fillings (table 2), the examining officer was cautioned to count only those restorations where caries had reoccurred or the material had broken, badly washed, or leosoned for some unknown cause. Even with these criteria, it was found that approximately one out of four recruits needed a defective restoration replaced.

The impossibility of rehabilitating patients dentally, with the present dentist-troop ratio, can readily be seen from table 3, which shows that for every four recruits, one bridge is needed.

The tremendous amount of time required for this type of treatment precludes its being rendered except when it is needed in the anterior portion of the mouth.

TABLE 2. *Defective fillings present on examination*

Age	Number of recruits	Number of defective fillings
16	4	
17	879	121
18	1,410	313
19	1,604	485
20	1,442	418
21	985	294
22	486	135
23	372	69
24	286	92
25	247	70
26	178	36
27	92	19
28	78	23
29	39	9
30-48	37	18
Total	8,139	2,102

The number of missing teeth (table 4) per recruit is 3.93, and the number of extractions needed averages 0.8 per individual. This does not take into consideration extractions that may be required when operative procedures are attempted or when prosthetic work is started.

A reflection of this total (4.73 missing teeth, when extractions are completed) can be seen in table 5, which lists the dentures needed. The results of this examination show that for every 100 recruits, 19 dentures of all types are required.



Table 6 reveals that 22 per cent of the recruits were in need of periodontal treatment of some degree, and that 45 per cent were in need of a prophylaxis.

TABLE 3. *Bridges present on examination, and number needed*

Age	Number of recruits	Status of dental bridges		
		Serviceable	Unserviceable	Needed
16	4			
17	879	6	1	200
18	1,410	24		314
19	1,604	38	1	414
20	1,442	34	1	420
21	985	33		264
22	486	22	2	101
23	372	15		77
24	286	19	2	66
25	247	15	1	55
26	178	4		37
27	92	5		11
28	78	2	1	16
29	39	5		15
30-48	37	6	2	1
Total	8,139	228	11	2,004

### DISCUSSION

A review of the literature<sup>1-5</sup> along with personal correspondence was made in an attempt to arrive at the probable number of new carious lesions per year in the recruits examined. The first large scale compilation that could be found was done by Hollan and Dunning,<sup>2</sup> who reported an annual increment of 1.75 new carious surfaces per person. Klein<sup>4</sup> found that in the young adult or college freshman age group, an annual increment of about 1.0 could be expected. Arnold, Dean, and Singleton<sup>7</sup> found an annual increment of 2.2 new carious surfaces per year. Examination of a group of freshman college students in Des Moines, Io

TABLE 4. Teeth missing and extractions needed

Age	Number of recruits	Missing teeth				Extractions needed				Average teeth missing per recruit	Average extractions needed per recruit
		Anterior		Posterior		Anterior		Posterior			
		U	L	U	L	U	L	U	L		
16	4	1		9	11					5.25	
17	879	165	36	1,785	1,851	73	13	365	161	1.36	1.01
18	1,410	252	72	2,351	2,448	99	19	497	658	3.79	.90
19	1,604	440			2,740	138	32	519	697	3.65	.81
20	1,442	350			2,184	100	21	499	583	3.71	.83
21	985				1,716	69	5	285	411	3.40	.78
22	486				822	33	10	138	122	3.77	.77
23	372			33	659	11	17	76	96	3.01	.71
24	286			195	509	13	6	68	78	3.66	.66
25	247			465	540	15	10	53	68	3.66	.74
26	178		18	381	396	6	1	47	57	4.94	.63
27	92		19	221	228	8		34	27	5.00	.75
28	78		11	202	171	17		17	29	5.15	.61
29	39		7	94	109	1			3	5.00	.61
30-48	37		13	106	99	3		9	5	6.50	.46
Total	8,139	2,320	574	14,242	14,880	586	131	2,634	3,184	3.93	.80

revealed 2.2 new carious lesions per person during the first year.<sup>8</sup> In the student body at Northwestern University Dental School, the annual rate established over a period of years with radiographic examinations was 1.2 new carious lesions per year.<sup>9</sup>

TABLE 5. *Dentures*

Age	Number of recruits	Upper						Lower					
		Full			Partial			Full			Partial		
		S*	U**	N***	S	U	N	S	U	N	S	U	N
16	4												1
17	879	7	4	13	5	2	55	1	1	3	1	1	100
18	1,410	8	4	14	23	3	93	4		3	5	2	169
19	1,604	18	5	21	43	13	111	4		3	10	2	157
20	1,442	17	7	17	29	11	110	3	3	8	6		166
21	985	15	7	23	31	4	55	2	2	3	7	1	106
22	496	5	2	4	18	3	31	2	1	3	3		37
23	372	11		2	9	3	18	3		4	4		27
24	286	4		6	5	3	15	1	1	3	1		21
25	247	4	3	4	7	4	21	4		1	3		27
26	178	7		2	4		13		1	1	2	1	28
27	92	6	1	4	3		5	3			4		11
28	78	4		2	2		8	1					13
29	39		1	1	3		3	1			2		3
30-48	37	1		1	1	2	2				1	1	1
Total	8,139	107	34	109	183	48	340	29	8	32	49	8	867

\*S=Serviceable

\*\*U=Unserviceable

\*\*\*N=Needed

In view of the preceding findings, I believe that 1.5 is a conservative estimate of the annual new caries rate for recruits in the Army. This would mean a total of 3 new lesions during the 2-year obligated period. Added to the average number of restorations needed on induction, it can be seen that the average young man of draft age, during his 2-year period in the Army, would require the insertion of 7.8 restorations if he were to be discharged in a caries-free condition.



revealed 2.2 new carious lesions per person during the first year.\* In the student body at Northwestern University Dental School, the annual rate established over a period of years with radiographic examinations was 1.2 new carious lesions per year.\*

TABLE 5. *Dentures*

Age	Number of recruits	Upper						Lower					
		Full			Partial			Full			Partial		
		S*	U**	N***	S	U	N	S	U	N	S	U	N
16	4												1
17	879	7	4	13	5	2	55	1	1	3	1	1	100
18	1,410	8	4	14	23	3	93	4		3	5	2	169
19	1,604	18	5	21	43	13	111	4		3	10	2	157
20	1,442	17	7	17	29	11	110	3	3	8	6		166
21	985	15	7	13	31	4	55	2	1	3	7	1	106
22	486	5	2	4	18	3	31	2	1	3	3		37
23	372	11		2	9	3	18	3		4	4		27
24	286	4		6	5	3	15	1	1	3	1		21
25	247	4	3	4	7	4	21	4		1	3		27
26	178	7		2	4		13		1	1	2	1	28
27	92	6	1	4	3		5	3			4		11
28	78	4		2	2		8	1					13
29	39		1	1	3		3	1			2		3
30-48	37	1		1	1	2	2				1	1	1
Total	8,139	107	34	109	183	48	540	29	8	32	49	8	867

\*S=Serviceable

\*\*U=Unserviceable

\*\*\*N=Needed

In view of the preceding findings, I believe that 1.5 is a conservative estimate of the annual new caries rate for recruits in the Army. This would mean a total of 3 new lesions during the 2-year obligated period. Added to the average number of restorations needed on induction, it can be seen that the average young man of draft age, during his 2-year period in the Army, would require the insertion of 7.8 restorations if he were to be discharged in a caries-free condition.

TABLE 6. *Extent of periodontitis found and prophylaxis needed*

Age	Number of recruits	Periodontitis				Prophylaxis needed	
		None	Slight	Moderate	Severe	Yes	No
16	4	4					4
17	879	714	96	55	14	351	528
18	1,410	1,109	178	102	21	609	801
19	1,604	1,265	215	94	30	686	918
20	1,442	1,139	185	93	25	596	346
21	985	781	110	71	23	454	531
22	486	360	76	35	15	220	266
23	372	295	48	26	3	163	209
24	286	192	48	32	14	152	134
25	247	179	36	24	8	136	111
26	178	108	32	30	8	109	69
27	92	64	11	13	4	56	36
28	78	49	13	13	3	54	24
29	39	26	8	1	4	22	17
30-48	37	23	6	8		24	13
Total	8,139	6,308	1,062	597	172	3,632	4,507

## SUMMARY

An examination of 8,139 recruits from all six Army Areas was conducted in order to determine the dental status of this group of young men. During a two-month period every third recruit reporting to the dental clinic was examined, and the results were recorded on a standard form.

For the average recruit, 4.8 restorations involving 7.2 surfaces were needed. One out of every four individuals needed a defective filling replaced, and one out of every four was in need of a bridge. The average recruit was missing 3.93 teeth with 0.8 extractions indicated. This did not include extractions needed for the construction of prosthetic appliances or where it was found impossible to render restorative treatment. For each 100 recruits, 19 dentures of all types were needed. Twenty-two per cent of all

patients examined had some degree of periodontal involvement, and 45 per cent were in need of a prophylaxis.

A review of the literature indicates that a caries expectant rate for each individual of 1.5 new lesions per year would be a conservative estimate. Coupled with the need for dental treatment observed in the average recruit, this means that during his two-year period in the Army, the average young man of draft age would require the insertion of a total of 7.8 restorations to discharge him in a caries-free condition.

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"Nevertheless, in most cases of furring of the tongue the cause of the furring is probably to be found in one of three conditions: local infection, a dry mouth, or the irritant effect of tobacco smoke. Local infection may come from the mouth itself (as in stomatitis), or from the nose or throat (as in tonsillitis, colds, and sinusitis), or from the lungs (as in bronchitis and pneumonia). Dehydration of the mouth may result from a general state of dehydration, or from the dry mouth of a fever, or from blocked nose, and smoking presumably acts by the direct irritant action of tobacco smoke on the tongue."

—I. S. L. LOUDON, B. M.  
in *British Medical Journal*  
p. 20, Jan. 1956

# MARITAL ADJUSTMENT PROBLEMS IN AN OVERSEAS THEATER

## Psychiatric Implications

JOHN W. BURKETT, *Major, MC, USA*

**T**HOSE who deal with emotional problems often need to be reminded that psychiatric patients cannot be considered as isolated cases or disease entities. They must be evaluated and understood in terms of their interpersonal relationships and of how their emotional difficulties affect not only themselves but others. To represent them as decompensations without reference to their current interpersonal relationships is of limited value in practical management.

Meaningful or positive interpersonal relationships such as close friendships, family ties, and good marital bonds constitute the foundation of mental health. They promote individual security and enable individuals to form group identities. Such factors are of recognized value in helping to sustain the soldier or officer in peace or combat. An impairment or paucity of such meaningful interpersonal relationships may result in loss of emotional support and consequent neurotic attempts to solve emotional problems.

The family life of both enlisted and officer personnel is often of primary importance in determining emotional adjustment. A careful evaluation of family life may reveal the dynamics of an otherwise obscure psychiatric disorder. It may be useful or even indispensable to interview and evaluate the wife and sometimes the children of the serviceman or officer with psychiatric symptoms. Conversely, when wives or children come to the psychiatrist for consultation, an evaluation of the emotional status of the husband is frequently indicated. The value of taking special note of current interpersonal relationships is well recognized by psychiatrists, but may be overlooked by other medical officers. Failure to take the patient's total current behavior into consideration often results in an inaccurate diagnosis and consequent improper management of the case.

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From Army Medical Service School, Brooke Army Medical Center, Fort Sam Houston, Tex. Dr. Burkett is now at Veterans Administration Hospital, Sepulveda, Calif.



This article emphasizes the need for taking all interpersonal relations of the patient into consideration, with special emphasis on marital adjustment, and points out the importance of this concept in an overseas theater, where marital problems appear to be more frequent than in the United States. It is believed that there was an actual increase in the more serious types of marital difficulties among military personnel in overseas theaters during the past few years, and the absence of the usual civilian physicians and ministers, to whom people with marital problems often turn, tended to increase the number of such cases encountered.

### DISRUPTIVE FACTORS

Overseas service presents unique factors which one would expect to increase general family problems, in particular marital difficulties. The most obvious of these is the usually long separation of the husband from the family. The necessity for the entire family to adjust to a foreign culture that is obviously different in language and customs and subtly different in attitudes and philosophy also plays a causative role. The anxieties of being in a potential combat zone tend to be displaced onto other situations and to exercise an adverse effect on family life. Children are faced with the emotional stresses incident to changing schools and forming new friendships when they arrive overseas. In the younger children the absence of the father for a significant period of time almost always causes some emotional problems. The presence of relatively large numbers of unmarried women with a low standard of living increases the possibility of marital infidelity with its consequent detrimental effect on family life.

Many of the officers and noncommissioned officers who were sent overseas during 1951 and 1952 had been recalled from the reserves and were faced with their second major disruption of family life within a few years. The availability of domestic help tended in many instances to decrease positive activity and to create leisure time that housewives were not equipped to use constructively. Family life for the husband in the combat unit was even more difficult. His intensive field training resulted in frequent and prolonged separations from his family even after they arrived overseas.

It is probable that all these and many other factors were operative in creating unique problems which in many instances resulted in marital tensions. This does not imply that severe marital difficulties were universal, for in most instances these problems were met realistically and an adequate adjustment made.

### LEGAL COMPLICATIONS

In cases of definite marital discord, legal and administrative red tape created additional problems. Legal separation was impossible, and return of the family to the United States might take

many months of endeavor. Temporary separation, which at times may help marital problems, was almost impossible. In a number of instances husbands who frankly admitted having girl friends continued to live with their families. This created an obviously impossible situation for the wife. She was put in the position of having either to report this situation to her husband's commanding officer or to attempt to ignore his conduct. Bringing the husband's actions to the attention of his commanding officer would probably result in disciplinary action in the form of a fine and thus result in a financial loss to the family. Attempting to ignore his conduct was rarely a satisfactory solution. The husband, if a noncommissioned officer, was usually reluctant to move out of his family quarters because it would result in forfeiture of his coveted permanent pass and seriously interfere with his romance.

### ANALYSIS OF CASES

The frequency of marital adjustment problems is reflected in this study of 173 dependent wives who were seen for psychiatric evaluation at an Army hospital in the period June 1953 to June 1954. Of these, 31 had serious marital problems in which at least one partner contemplated divorce, the wife contemplated return to the United States, or the husband was openly unfaithful. None of these 31 wives were psychotic, but all gave indications of previous emotional instability, neurotic symptoms, or severe dependency needs.

Of the dependent wives evaluated there was a higher ratio of hospitalizations (18 out of 31) than normally occurs in psychiatric practice. This is probably due to the fact that outpatients were usually from the local area served by the hospital, while most of the hospitalized patients were transferred from other hospitals. Many of these patients had been treated unsuccessfully with various medications; often they had not confided in the medical officer who first saw them, nor had he asked them about their general life adjustment.

### CASE REPORTS

The following cases illustrate the effects of severe marital problems.

**Case 1.** The 41-year-old wife of a Sergeant was admitted to the closed psychiatric ward because of sudden and complete amnesia. She stated that she did not remember her identity or any of her past life, and did not recognize her husband. Her husband stated that just prior to the onset of her symptoms she "became cold as ice and shook all over." When the husband was interviewed, he was at first guarded and stated that nothing unusual had happened recently and that he could think of no emotional disturbances in the home. With encouragement, however, he disclosed that two days prior to the onset of his wife's amnesia he had told her he wanted a divorce in order to marry a European girl. He

had previously hinted at his dissatisfaction with their marriage, and had made little effort to conceal his interest in the other woman. The patient had refused to discuss the problem with him.

During the interview, the husband frankly stated that he had fallen in love with the other woman and had no intention of trying to continue his marriage. He did, however, express some guilt in relation to his wife's illness and said that he would take no further action until she was well. Questioning revealed that he was influenced by the other woman's ability to make him feel important.

The patient's past history revealed a lifelong pattern of passivity, dependency, marked feelings of inferiority, and severe sexual conflicts. Although she had had no previous psychiatric hospitalizations, she had experienced a period of amnesia lasting several hours at the port of embarkation just prior to going overseas. It was subsequently learned that she had been uncertain about joining her husband because of his apparent indifference to her joining him, as reflected in his letters. She had previously been married, as had her present husband, and had three children by her first marriage. She married her present husband two years prior to his going overseas, largely because of economic insecurity.

She had complete amnesia and perplexity on admission to the hospital, but recalled all events following her entry. There was no indication of psychotic behavior or thought content.

During the first three days of her hospitalization she gradually recalled a few things about herself, among them her first marriage but not her present one. She also recalled some details of her early childhood. For several days she made no further progress despite daily psychotherapeutic interviews and strong suggestion. During intravenous administration of Amytal Sodium (brand of amobarbital sodium) she was able to recall all the details of her present marriage. This was accompanied by considerable emotional display. Following the interview she was tearful, depressed, and anxious. As she responded to psychotherapy, she was discharged and followed as an outpatient. She eventually was able to face her marital problem without recourse to neurotic symptoms.

*Comment.* This patient was a very dependent person who was unable to bear the thought that her husband wanted to divorce her, because it threatened her self-esteem and created feelings of helplessness. Her symptom of amnesia was clearly a rather poor defense against the anxiety that the conscious realization of her problem would create. Although the amnesia cleared after the administration of Amytal Sodium, it was followed by anxiety and depression.

**Case 2.** The 30-year-old wife of a Captain brought her 7-year-old son to the psychiatric clinic, stating that he complained of abdominal pain and was nauseated and irritable. He had been referred from the pediatric clinic after thorough evaluation failed to reveal any physical

cause for his complaints. He had been given various medications without improvement. Following her description of the child's behavior and symptoms she said that she herself had lost 31 pounds. She went on to say that the child complained most when she was upset and that she felt maybe she was more in need of help than the child was. She then suddenly stated that she was very upset lately because her husband was having an affair with a girl. Her husband had told her that he planned to retire overseas and live with the girl. She had been married eight years and believed that prior to her arrival a few months ago she had had no major marital difficulties.

She appeared to be a rather insecure, passive woman, but her previous emotional adjustment had been fairly good. She gave a history of severe tension-type headaches for many years. During the interview she cried a great deal and said that she did not want to leave her husband for fear of losing his financial support and of being unable to provide for herself and her child. Her husband had stated openly and definitely that he intended to continue his affair with the girl; however, he was reluctant to apply for his wife's return to the United States because he felt that it might adversely affect his Army career.

The child was pale and timid but not severely disturbed. It was clear that he was well aware of his parent's marital difficulties and was concerned about them. The mother was seen as an outpatient several more times and finally was able to go to her husband's commanding officer and discuss the entire problem with him. The child was not seen again, but the mother reported that he had become asymptomatic. The commanding officer said she could not go back to the United States without her husband's consent, but he impressed the husband with his duty to his family and the unreality of his present attitude toward his wife, and indicated that a modification of his attitude was desirable.

*Comment.* In this case, what appeared to be a pediatric problem was only part of a generally disturbed family situation. The mother was a very dependent person and totally unable to insist that her husband discontinue his affair with the girl. She clung to the fantasy that her marriage was a success and the present affair more the fault of the girl than of the husband.

*Case 3.* The 45-year-old wife of a Captain with 17 years' service was admitted to the psychiatric section after an apparent suicide attempt with a sedative. Her husband had found her unconscious on the steps of their home on the evening of admission. According to her husband, her behavior that day had not been unusual. She had served his dinner in the usual manner and then said that she was going for a walk with the dog. Just before leaving she took eight Seconal (brand of secobarbital sodium) capsules, which she previously had been given at another medical installation because of insomnia.

Interview with the husband revealed that during their 13 years of marriage there was little real affection between them, and that he had never considered the marriage a great success. He had, however, con-

had previously hinted at his dissatisfaction with their marriage, and had made little effort to conceal his interest in the other woman. The patient had refused to discuss the problem with him.

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Interview with the husband revealed that during their 13 years of marriage there was little real affection between them, and that he had never considered the marriage a great success. He had, however, con-

tinued to live with his wife since there were no actual quarrels or disagreements. Recently he had met a girl with whom he believed he was in love. Several weeks prior to his wife's suicide attempt he had openly stated that he no longer loved her and wanted her to return to the United States. She refused to do so, and he had continued to go out with the girl. During this time his wife suffered from insomnia and irritability. He realized that this was a rather unusual situation but felt that it was more convenient to live with his wife than move into the bachelor officer's quarters. One of his chief complaints about his wife was that she seldom gave him encouragement or support.

The patient's past history was characterized by chronic depression and several previous suicide attempts which had resulted in hospitalization. Her life had been rather colorless and she had few outside interests. There were no children, and neither she nor her husband particularly desired any. She felt, however, that hers had always been an "ideal marriage" and did not understand her husband's present attitude. She blamed the girl friend for her difficulties and expressed no overt hostility toward her husband. Although she was a licensed laboratory technician and had held a good position prior to joining her husband overseas, she was fearful about being without her husband's financial support. She had made no effort to seek legal advice regarding support in the event that she was divorced.

On entry to the hospital she was comatose, but completely recovered from the effects of the sedative after 24 hours. She was discharged after six days and followed as an outpatient. She was finally able to think about her future and past life more realistically and sought legal advice for her marital problem.

*Comment.* This patient's life had been characterized by denial of difficulties and repression of hostility. The marriage might have continued in much the same pattern if the husband had not gone overseas and found a woman who seemed to meet his needs.

#### DISCUSSION

Most of the cases presented a similar picture: a passive woman married to a relatively narcissistic man. The wife was unable to meet the neurotic needs of her husband. This did not lead to significant marital difficulties until the husband arrived overseas and met a woman who bolstered his self-esteem and at the same time satisfied his dependency needs. When this happened and the husband requested a divorce, the wife was totally unprepared to meet the situation in a realistic manner. In many instances the husband candidly admitted having a girl friend but continued to live under the same roof with his wife. This unrealistic and stressful situation was largely the result of the unique housing situation for dependents overseas. In all cases attempts were made to understand the personality characteristics and needs of both husband and wife, and to apply this knowledge toward improving their interpersonal relationships.

The large number of cases observed emphasized the extent of emotional disturbances in the dependent wives of servicemen and officers in an overseas theater. No attempt was made to include cases in which the marital problem was a minor one. In all these cases there was a serious marital problem, apparently directly related to the unique stresses of an overseas theater. All of the cases seen were of neurotic women whose marriages were only superficially stable or meaningful before their husbands went overseas. In these instances in which the husband deserted his wife for another woman primarily because of his own neurotic needs, he appeared to be more neurotic than the wife. It is believed that many of these marriages would have remained superficially stable had both partners remained in the United States. In some cases prompt legal separation or divorce probably would have decreased the emotional disturbance in the wife. A wife living in the same house as her husband and aware of her husband's interest in another woman is caught in an impossible situation.

The actual extent of marital problems is even more serious and widespread than would be suspected from the number of cases mentioned here. Many persons with marital problems resulting from the stresses of being overseas do not come to the attention of the psychiatrist but seek medical advice for various symptoms of anxiety. Some marital problems are never brought to the physician because of fear that the husband would be disciplined and the whole family suffer financial and other consequences.

### CONCLUSIONS

The importance of recognizing and dealing with the emotionally disturbed patient in terms of his interpersonal relationships is often neglected. This is clearly illustrated by the number of patients with severe marital problems that go unrecognized because of failure to take the patient's total life situation into consideration. Such severe marital conflicts are more likely to occur in an overseas theater and are probably aggravated by some administrative policies. There are certain unique circumstances encountered by military personnel and their families overseas which adversely affect harmonious family life in general and marital adjustment in particular. It is suggested that efforts should be made to reduce some of the unique stresses in an overseas theater. The early recognition of such cases by medical officers might also help prevent the more serious types of emotional disturbance encountered.

### SUMMARY

In one year, 173 dependent wives of servicemen were seen for psychiatric evaluation at an overseas Army hospital. Thirty-one of these patients had emotional disturbances resulting from serious marital problems.



During overseas service, unique disruptive factors increase family problems and marital difficulties in general. The medical officer must recognize the effect of these disruptive influences when evaluating emotional disturbances in military personnel overseas.

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#### STRESS AND THE MILITARY

"Men with strong passive dependency drives who have functioned efficiently in combat and were promoted rapidly find it stressful, while separated from their families, to adapt to a peace-time Army routine involving assumption of full responsibility of grade in new units.

"Peace-time assignment of career soldiers to the locale in which they first were in combat can serve as a stressful element in persons who are not emotionally mature and who hold strong negative nationalistic prejudices."

—FREDERICK A. ZEHRER, Lt. Col., MC, USA  
in *Medical Bulletin of the U. S. Army*,  
*Europe*, p. 48-49, Feb. 1956

## Lethal Midline Granuloma and Periarteritis Nodosa

BYRON G. McKIBBEN, *Colonel, MC, USA*

MILWARD W. BAYLISS, *Colonel, MC, USA*

CASES of granulomatous ulceration, having their primary site in the midline tissues of the face, usually running an indolent course, even appearing to heal at times, but eventually ending fatally, occasionally have been reported in medical literature.<sup>1</sup> Similar cases of granuloma of unknown cause were reported as far back as 1906.<sup>2</sup>

Weinberg<sup>3</sup> presented two cases of granuloma of unknown cause associated with periarteritis nodosa, in which he concluded that the vascular lesions were recent because there was no evidence of healing. He further stated that in all the cases of granuloma of obscure cause that were thoroughly studied and fully reported, periarteritis nodosa was a terminal development. In contrast to this, two of the cases inadequately studied by Williams<sup>1</sup> failed to show the lesions of periarteritis nodosa.

Wogener<sup>4</sup> described periarteritis nodosa as a common finding in patients with lethal granuloma. He believed that the condition causing the granuloma might also be the one causing the periarteritis nodosa. Gerlach<sup>5</sup> described necrosis of arterioles at the site of the Arthus phenomenon. Williams stated that this observation had been confirmed repeatedly and therefore suggested that the same necrotic vascular reaction causing Arthus phenomenon when it involves capillaries is also responsible for periarteritis nodosa when it involves somewhat larger vessels.

Williams further concluded that one of the fundamental resistance mechanisms of the animal is a typical cellular immune response, primarily vascular, resulting in the Arthus phenomenon when capillaries are involved, producing a granuloma in deeper tissues or a granulomatous ulceration if skin and subcutaneous tissues are involved; that the granulomatous ulceration has a tendency to occur in the midline of the face, but is not confined to this location; and that there is a tendency for the involvement of the larger vessels (periarteritis nodosa) to occur in the end stages of the disease.

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From Letterman Army Hospital, San Francisco, Calif. The authors are now assigned to the Tokyo Army Hospital, APO 500, San Francisco, Calif.

Kahn<sup>4</sup> suggested that the reacting areas are sites of tissue hyperimmunity where antibodies formed from insoluble globulins are in excess. During later infections these areas of hyperimmunity extract specific or nonspecific antigens circulating in the blood and localize them with the production of the necrotizing and granulomatous vascular phenomena. He further suggested that allergic persons are the ones who develop these areas of hyperimmunity. This explains the development of the Arthus phenomenon when the body is invaded by bacteria which produce little or no toxin, and also explains the occurrence of this phenomenon in the absence of specific infection in a hyperimmune person, by the activation of highly immunized areas of tissue by nonspecific, nontoxic proteins gaining entrance to the blood stream. It has been shown that necrosin, which is either a euglobulin or is associated with this fraction in exudate and is liberated by injured cells, is a toxic substance capable of causing the central necrosis.<sup>5</sup>

The experimental work of Selye<sup>6</sup> suggested a relative adrenal cortical dysfunction with excess production of the "salt-active" and relative suppression of the "sugar-active" corticoids. He found that excess sodium ion and an increased pH favor the development of periarteritis nodosa under experimental conditions, whereas elimination of sodium ion together with the giving of acidifying drugs tends to prevent its development. In 1949 Williams commented that the availability of hormones of the adrenal cortex would make possible new approaches to the study of granulomas.

Reports of cases of periarteritis nodosa responding favorably to cortisone or corticotropin began to appear in the medical literature;<sup>7,8</sup> and some related disorders, such as lupus erythematosus disseminata,<sup>10</sup> asthma, and vasomotor rhinitis,<sup>11</sup> were showing improvement on such treatment.

With evidence pointing toward a relationship between idiopathic granuloma and periarteritis nodosa, Williams and Hochfilzer<sup>12</sup> tried the effect of injections of cortisone on a patient in whom the diagnosis was idiopathic granuloma of the midline tissues of the face. While the course of the disease appeared to be altered somewhat favorably, they were of the opinion that cortisone would not prove to be a useful drug in the management of this condition, because of the slowness of healing and the unfavorable side effects, namely, interference with potassium metabolism and production of some general deterioration in the patient's condition.

In 1953 Hagans, Parry, and Markson<sup>13</sup> reported a case of lethal granuloma of the nose and face treated with corticotropin which had remained healed 7 months. Follow-up, 22 February 1956, revealed that the patient had required no further treatment and

had remained entirely well.<sup>15</sup> Full evaluation of this treatment however, awaits its use in more cases.

Early reports on the treatment of disseminated lupus erythematosus and polyarteritis nodosa with cortisone and corticotropin were optimistic, but it became apparent that the treatment was supportive only, and in no sense curative of the disease.<sup>16</sup>

Malkinson and Wells<sup>17</sup> reviewed the therapeutic results of adrenal steroids on periarteritis nodosa and in conclusion stated that corticotropin and cortisone were the most effective agents for the treatment of this condition, despite serious disadvantages; that their use must be weighed carefully in each instance, and that one may expect the best results in a relatively young patient in whom treatment is started prior to the development of extensive visceral lesions and continued with proper dosage long enough for abatement of abnormal signs, symptoms, and laboratory findings.

The treatment of lethal midline granuloma remains obscure, and because of the rarity of this condition, it is not believed that a clear-cut regimen can be outlined in the near future. Until this condition is better understood, and in view of its apparent close causative relationship to periarteritis nodosa, it is suggested that measures which are found to be of value in the latter condition also be tried on lethal granuloma, and that when cortisone or corticotropin are proscribed, they be given in accordance with the principles suggested by Malkinson and Wells.

### CASE REPORT

A 33-year-old white housewife was first seen in the ear, nose, and throat clinic of a U. S. Army hospital in Germany, 6 November 1952, with a complaint of difficulty in breathing through the left nostril. She stated that she had felt well until early October 1952, when she became aware of a slight nasal obstruction and pinkish color on her handkerchief after blowing her nose. She thought she had a cold and paid little attention to her symptoms.

Approximately five weeks before the onset of the nasal symptoms, she had noticed a small, tender nodule in each buttock, and one in the medial aspect of the left thigh. She had a cholecystectomy scar which was intermittently tender, and it was during a hospitalization for surgical revision of this scar and excision of the nodule in the thigh that she was seen by the otolaryngologist.

Past history and family history revealed that she had had one tubal pregnancy treated surgically. Two other pregnancies terminated in the birth of normal children. In 1946, she had a chronic cough for three months, followed by bronchial pneumonia. She was treated with sulfadiazine and was confined to her bed for 12 days. During the convalescent period she was troubled with pain in the right side of the chest posteriorly. Recovery was complete.

Kahn<sup>6</sup> suggested that the reacting areas are sites of tissue hyperimmunity where antibodies formed from insoluble globulins are in excess. During later infections these areas of hyperimmunity extract specific or nonspecific antigens circulating in the blood and localize them with the production of the necrotizing and granulomatous vascular phenomena. He further suggested that allergic persons are the ones who develop these areas of hyperimmunity. This explains the development of the Arthus phenomenon when the body is invaded by bacteria which produce little or no toxin, and also explains the occurrence of this phenomenon in the absence of specific infection in a hyperimmune person, by the activation of highly immunized areas of tissue by nonspecific, nontoxic proteins gaining entrance to the blood stream. It has been shown that necrosin, which is either a euglobulin or is associated with this fraction in exudate and is liberated by injured cells, is a toxic substance capable of causing the central necrosis.<sup>7</sup>

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In 1953 Hagens, Parry, and Markson<sup>14</sup> reported a case of lethal granuloma of the nose and face treated with corticotropin which had remained healed 7 months. Follow-up, 22 February 1956, revealed that the patient had required no further treatment and

had remained entirely well.<sup>15</sup> Full evaluation of this treatment however, awaits its use in more cases.

Early reports on the treatment of disseminated lupus erythematosus and polyarteritis nodosa with cortisone and corticotropin were optimistic, but it became apparent that the treatment was supportive only, and in no sense curative of the disease.<sup>16</sup>

Malkinson and Wells<sup>17</sup> reviewed the therapeutic results of adrenal steroids on perinarteritis nodosa and in conclusion stated that corticotropin and cortisone were the most effective agents for the treatment of this condition, despite serious disadvantages; that their use must be weighed carefully in each instance, and that one may expect the best results in a relatively young patient in whom treatment is started prior to the development of extensive visceral lesions and continued with proper dosage long enough for abatement of abnormal signs, symptoms, and laboratory findings.

The treatment of lethal midline granuloma remains obscure, and because of the rarity of this condition, it is not believed that a clear-cut regimen can be outlined in the near future. Until this condition is better understood, and in view of its apparent close causative relationship to perinarteritis nodosa, it is suggested that measures which are found to be of value in the latter condition also be tried on lethal granuloma, and that when cortisone or corticotropin are proscribed, they be given in accordance with the principles suggested by Malkinson and Wells.

### CASE REPORT

A 33-year-old white housewife was first seen in the ear, nose, and throat clinic of a U. S. Army hospital in Germany, 6 November 1952, with a complaint of difficulty in breathing through the left nostril. She stated that she had felt well until early October 1952, when she became aware of a slight nasal obstruction and pinkish color on her handkerchief after blowing her nose. She thought she had a cold and paid little attention to her symptoms.

Approximately five weeks before the onset of the nasal symptoms, she had noticed a small, tender nodule in each buttock, and one in the medial aspect of the left thigh. She had a cholecystectomy scar which was intermittently tender, and it was during a hospitalization for surgical revision of this scar and excision of the nodule in the thigh that she was seen by the otolaryngologist.

Past history and family history revealed that she had had one tubal pregnancy treated surgically. Two other pregnancies terminated in the birth of normal children. In 1946, she had a chronic cough for three months, followed by bronchial pneumonia. She was treated with sulfadiazine and was confined to her bed for 12 days. During the convalescent period she was troubled with pain in the right side of the chest posteriorly. Recovery was complete.

Examination of the nose on 6 November 1952 revealed an area of ulceration on the left side of the nasal septum and another on the medial surface of the anterior portion of the left inferior turbinate. The cardiolipin test for syphilis was negative. Complete blood cell count and urinalysis were normal.

On 7 November a tender nodule in the cholecystectomy scar and one in the left thigh were excised. Histologic examination showed large central areas of scarring granulation tissue with scattered microabscess-like features. Eosinophils were prominent and there were a few macrophages laden with brown and granular pigment. The diagnosis was granulomatous panniculitis (fig. 1).

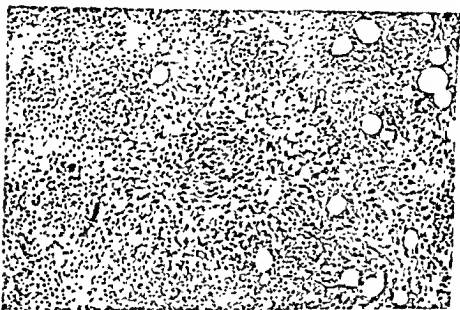


Figure 1. Photomicrograph of section of the nodule from the buttock showing granulomatous panniculitis with infiltrate composed of lymphocytes, plasma cells, neutrophils, and eosinophils. The wall of the small arteriole in the center has a smudgy appearance due to fibrinoid degeneration. (Hematoxylin and eosin stain,  $\times 100$ )

On 14 November biopsy specimens were removed from the nasal lesions, which by that time had extended to the right nasal fossa. The tissue was soft, friable, and bled easily, and the nose was very tender and painful. Histologic examination showed acute and chronic inflammation (fig. 2). Cultures from this material showed a moderate growth of hemolytic *Micrococcus pyogenes* var. *aureus* (*Staphylococcus aureus*), *Micrococcus pyogenes* var. *albus* (*Staphylococcus albus*), and *Corynebacterium xerosis*.

The patient had been noticing an increasing deafness and pain in the right ear. On 25 November, the right tympanic membrane perforated spontaneously, releasing sanguinopurulent material. The patient was admitted to the hospital the following day. Culture from the aural dis-

charge and from the right nostril showed a heavy growth of hemolytic *M. pyogenes* var. *aureus*, moderately sensitive to streptomycin sulfate and chlortetracycline hydrochloride (aureomycin). Cultures for yeast and fungi were negative. One gram of streptomycin sulfate was given daily from 28 November to 11 December, when, because the patient's condition had not improved, the dose was doubled. Both nasal cavities were almost completely closed and the ulcerated areas were surrounded with friable-appearing mucosa which bled easily. The pain in her ear became almost unbearable, and she was depressed and cried at times.

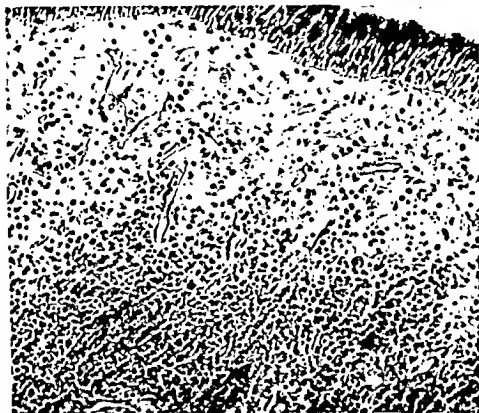


Figure 2. Nasal biopsy. Section showing acute and chronic inflammation with a dense infiltrate of neutrophils, eosinophils, lymphocytes, and plasma cells. (Hematoxylin and eosin stain,  $\times 200$ )

By 19 December she was showing a little improvement, the pain was less severe and she was allowed to return to her home for the holiday season. Streptomycin sulfate was discontinued and 500 mg of chlortetracycline hydrochloride, four times daily, was prescribed.

The patient's condition continued to improve until 19 January 1953, when her hearing again became poor and there was recurrence of pain in her ears and nose. Shortly after this, an area of swelling associated with severe pain developed below the left eye, and she was again admitted to the hospital.

At that time it was noted that she was having a great deal of difficulty in hearing, the masses in the buttocks had increased in size, the nasal lesions were more extensive, acute dacryocystitis had



developed on the left side, and she had lost 23 pounds since the onset of her illness. The swelling under the left eye became fluctuant and on 2 February it was incised and allowed to drain.

The patient was transferred to an Army general hospital, and on 10 February two large masses were removed from the right buttock and one from the left buttock. Histologic examination showed acute and chronic inflammatory infiltrate, including neutrophilic and eosinophilic polymorphonucleocytes, lymphocytes, plasma cells, monocytes, foam cells, and multinucleated foreign-body type giant cells. There were areas of necrotic foci, some of which were seen grossly as soft central areas. The fibrous stroma varied from a very cellular to hyaline structure. There was no evidence of epithelioid tubercle formation. During this hospitalization the white blood cell count had dropped to 3,200 per  $\mu$ l on one occasion and to 4,300 on another, with a normal differential count. Hemoglobin was 9.8 g per 100 ml. Repeated cultures of secretions showed hemolytic *M. pyogenes* var. *aureus* sensitive to penicillin and chlortetracycline hydrochloride. The urine remained normal. Her record did not show treatment for anemia or leukopenia, and she was discharged from the hospital on 21 February 1953.

She was readmitted to the hospital on 4 March, complaining of pain in both ears and nose. Examination showed the right tympanic membrane to be perforated and there was bloody discharge. The left tympanic membrane was bulging. There was a small healing lesion in the left lower eyelid. The incision over the lacrimal sac was healed. There was a large perforation through the cartilaginous portion of the nasal septum. Tuning-fork tests indicated a marked conduction deafness. White blood cell count was again normal, red blood cell count was 3,840,000 per  $\mu$ l, and the hemoglobin was 12.7 g per 100 ml. Tuberculosis of the nose was suspected, and the patient was transferred to an Army general hospital where the diagnosis was thought to be eosinophilic granuloma of the nose, paranasal sinuses, left nasolacrimal duct, ears and temporal bones, and subcutaneous tissues of the buttocks and thighs. She was evacuated to the United States, arriving at this hospital 14 April 1953, where she was admitted on the otolaryngology service.

Examination revealed a thin, chronically ill woman, moderately depressed and in obvious discomfort. The patient's entire room was filled with a putrid odor. Her blood pressure was 118/70 mm Hg. Her temperature was normal. She spoke with difficulty because of numerous small tender lesions in the mouth. A deep ulcer, with raised erythematous edges, was noted just below, and medial to, the left eye, which was held closed most of the time (fig. 3). The right tympanic membrane was lusterless. The left tympanic membrane was retracted and there was a foul discharge although a perforation was not seen. Hearing was greatly diminished and tuning-fork tests indicated bilateral conduction deafness. Both nasal passages were greatly diminished in size because of granular, ulcerating masses on all surfaces.

The septal perforation, previously mentioned, was noted. The lesions on the buttocks were still draining, and small tender subcutaneous masses were noted on both shoulders and on the anterior aspect of the right thigh. The liver was palpated three fingersbreadth below the costal margin and was tender. The spleen was palpated two fingersbreadth below the costal margin and was not tender.



*Figure 3. Granulomatous ulceration of the face, apparently originating in the nasolacrimal tract. Autopsy demonstrated a sinus tract leading to an ethmoid cell.*

A tentative diagnosis of lethal midline granuloma was made. This was concurred in by the otorhinolaryngology consultant who advised that the secondary infection be brought under control with adequate antibiotic therapy and that the patient be given a course of cortisone. The medical consultant, while agreeing that the condition could be one of the collagen diseases, strongly advised against cortisone because of the danger of causing a widespread dissemination of the infection. The surgical consultant said he had never seen anything quite like it and suggested that an anaerobic infection might be the cause.

Biopsy specimens revealed a granulomatous inflammation of undetermined cause in a nodule on the right thigh, acute and chronic inflammation of the nasal mucosa, and necrotic tissue in a specimen from the tongue.

Roentgenograms of the sinuses showed marked thickening of the mucous membrane of the right maxillary sinus and complete cloudiness of the left maxillary sinus. There was no evidence of pathologic change in the bones of the skull.

Culture from the nasal mucosa grew nonhemolytic *M. pyogenes* var. *aureus* sensitive to chlortetracycline hydrochloride, Terramycin (brand

of oxytetracycline), Chloromycetin (brand of chloramphenicol), and erythromycin. Smears and cultures for acid-fast bacilli were negative. Guinea pigs inoculated with material aspirated from the left maxillary sinus and obtained by biopsies of the nasal mucosa and a subcutaneous nodule died prematurely of causes other than tuberculosis.

Between 17 and 23 April the patient was given x-ray therapy: 450 r (in air) to an 8- by 11-cm frontal portal and an equal dose to a 10- by 10-cm left lateral portal, with no significant improvement.

Because of the widespread involvement, the patient was transferred to the medical service on 25 April for general care. She continued to be seen daily by a member of the otolaryngology service.

Five hundred milligrams of chloromycetin, four times daily, was prescribed, pending the result of sensitivity studies being made in Dr. Brainard's laboratory at the University of California.

On 29 April it was the consensus at a medical conference that there was some unknown abnormality in the patient's body defense mechanism that could possibly be a lethal midline granuloma, but that the most obvious treatable disease was the widespread micrococcus infection, which was thought to be secondary. Sensitivity tests, run at the University of California, revealed that the organism was highly sensitive to chlortetracycline hydrochloride and relatively insensitive to all other antibiotics tested. Treatment was therefore changed from Chloromycetin to chlortetracycline hydrochloride in the same dosage. A Levine tube was passed into the stomach for the administration of medications and feeding formula.

Repeated blood cultures showed no growth. By 3 May the patient was beginning to show slight improvement; the nodules on the arms and thighs appeared reduced slightly in size but the lesions about the nose and upper lip had extended somewhat. The next day a number of deep red purpura-like spots were noted on the inner aspect of both legs. The subcutaneous lesions, however, continued to improve. By 18 May, the purpuric lesions had begun to fade, liver and spleen were no longer palpable, her mouth began to improve and she was able to sit in a chair for short periods. By 30 May she could breathe some through her nose, and the wounds on her face appeared to be improved. On 11 June, it was noted that her hemoglobin had dropped to 7.8 g per 100 ml. She was, therefore, given transfusions of whole blood (500 ml each). She was still showing improvement on chlortetracycline hydrochloride four times daily.

On 17 June examination revealed three areas of involvement of the perineum. One of these areas was excised and histopathologic examination showed nonspecific granulomatous inflammation.

By 22 June improvement had come to a standstill. The patient was beginning to show some signs of going downhill, but by increasing anorexia, mild mental depression, and

elevations, and a mild drop in blood pressure (90 to 100 mm Hg systolic and 64 to 72 diastolic).

On 25 June culture from a buttock wound was reported as showing *M. pyogenes* var. *aureus*, sensitive only to Chloromycetin and bacitracin, and pseudomonas resistant to all antibiotics tested. Hemorrhagic lesions developed on the back of the patient's left hand, and small vesicles were noted over the left forearm and anterior chest. The liver and spleen were again palpable. The patient was unable to tolerate Chloromycetin, and was started on 25 mg of cortisone every six hours and 1 gram of potassium chloride three times daily. Her course was rapidly downhill, with increasing hemorrhagic skin lesions, marked perspiration, temperature of 102°F, and generalized nervous twitchings, and she died 30 June.

**Autopsy.** Autopsy performed 10 hours after the patient's death revealed the following pathologic processes which had not been observed previously.\*

1. Necrotizing panarteritis (periarteritis nodosa) involving vessels of the stomach, intestines, liver, kidneys, and bladder. There were a few arteries in the kidneys and one in the liver in which fibrosis suggested healed panarteritis (fig. 4).



Figure 4. Connective tissue of the liver containing partially healed lesion of periarteritis nodosa in a small artery. This artery is practically obliterated by scar tissue while only a few inflammatory cells and a slight amount of fibrinoid material remain. (Hematoxylin and eosin stain,  $\times 100$ )

\*Gross and microscopic examination was performed by Captain Joseph H. Masters, and the slides were reviewed by Dr. Alvin J. Cox, Major T. R. Anderson, and one of us (M. W. B.).

2. Inflammatory angitis of the lungs, kidneys, adrenals, and skin.
3. Mucosal ulceration of the stomach and intestines.
4. Necrotizing granulomatosis of the lungs and kidneys.
5. Necrotizing bronchitis.
6. A sinus tract leading from the infraorbital ulceration to an ethmoid cell.
7. Blood culture (heart) revealed hemolytic *M. pyogenes* var. *aureus*, coagulase-positive.

### COMMENT

It is interesting to note that there was some evidence of healed panarteritis in the kidneys and liver. Although the main picture was one of extensive inflammation and necrosis, there were a few fibrosed arteries, lacking in inflammatory cells, suggesting focal areas of healing or healed panarteritis. While periarteritis nodosa has been considered to be a terminal development in cases of idiopathic granuloma,<sup>1,2</sup> this observation indicates that some of the vascular lesions had developed in an earlier stage of the disease.

### SUMMARY

A case of lethal midline granuloma associated with periarteritis nodosa is presented. While periarteritis nodosa tends to be a terminal development in cases of idiopathic granuloma, the finding of a few focal areas of healed panarteritis in this case is evidence that these healed lesions, at least, developed during an earlier stage of the disease.

The two conditions (lethal midline granuloma and periarteritis nodosa) appear to be the result of hyperimmunity, causing the granulomatous lesions when capillaries are involved and periarteritis nodosa when somewhat larger vessels are involved.

Cortisone or corticotropin, in order to be of any benefit in the treatment of lethal granuloma or periarteritis nodosa, should be given early in the course of the disease, in adequate dosage and with careful supervision.

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### EVALUATION OF DISCOID LUPUS

"The classification of lupus erythematosus is an arbitrary one. There are many transitions between the types. Discoid lupus, from its inception, is a systemic disorder which is a variant of the more malignant acute disseminated form. The "benign"-appearing cutaneous lesion may be a herald of advanced systemic manifestations which may be present at the same time or at a later date, when the skin changes have healed. Therefore, all these patients should have a thorough general medical survey. The form of therapy instituted depends entirely upon the extent of the disease."

—E. L. DUBOIS, M. D., and  
STUART MARTEL, M. D.  
in *The Journal of the American Medical Association*, p. 811, June 30, 1956

## Placenta Accreta

JOHN R. O'BRIEN, M. D.

CHARLES C. SORENSON, Major, USAF (MC)

GORDON W. SCOTT, Captain, USAF (MC)

FREDERICK SILVERMAN, Captain, USAF (MC)

**P**LACENTA ACCRETA is "an abnormal adherence of part of the placenta or all of it to the uterine wall with partial or complete absence of the decidua basalis, especially the spongiosum layer."<sup>1</sup> Based on the depth of invasion of trophoblastic elements, Kallreider<sup>2</sup> classified the condition as: (1) placenta accreta (pathologic adherence only), (2) placenta increta (penetration of uterine wall), and (3) placenta percreta (uterine wall penetrated to or through serosal layer, and in some cases ruptured). A second classification describes the surface extent of the abnormal placental attachment: focal, partial, or complete.<sup>3</sup>

The main causal factor appears to be injury to the endometrium by trauma, infection, an associated obstetric or gynecologic disorder, or an endocrine imbalance. Traumatic causes include previous manual removal of an adherent placenta leaving scars, dilatation and curettage, therapeutic abortion, radium therapy, and cesarean section. Infections include tuberculous peritonitis and endometritis. Fibroids, diverticula, placenta praevia, cornual implantation, placenta membranacea, and adenomyosis have been listed as associated obstetric or gynecologic disorders. A defective corpus luteum might contribute to an endocrine imbalance leading to placenta accreta.<sup>1,4-6</sup>

Various estimates as to incidence range from 1:1956 (Irving and Hertig<sup>7</sup>) to 1:25,000 (Chern and Rosenberg<sup>8</sup>). Greenhill<sup>1</sup> believed it to be 1:2,000; Chisholm,<sup>9</sup> from 1:200 to 1:20,000; and Phaneuf<sup>6</sup> found an occurrence of 1:14,622 in his survey. Eastman<sup>7</sup> did not observe a single case of complete accreta in over 70,000 deliveries. Only a few more than 200 cases were recorded up to 1953.<sup>1</sup> Israel, Siegel, and Rubenstein<sup>10</sup> stated that a total of 31 cases of simultaneous placenta praevia and accreta had been recorded in the literature up to 1955.

Clinically, there is only a failure to expel the placenta normally. Normal separation from areas totally lacking in decidua is impossible. With complete accreta no bleeding is present because all of the placenta is adherent. Some retained placentas

may be focal placenta accretae, with multiple fibrous attachments to the uterus. Partial accreta is often accompanied by the severe bleeding associated with partial separation. In rare instances, hemorrhagic shock may be associated with spontaneous rupture of the uterus and/or trophoblastic erosion of large uterine artery branches, leading to massive intra-abdominal hemorrhage. Other factors which may cause hemorrhage are placenta praevia, traumatic attempts at manual removal leading to rupture of the uterus, rupture by a curet, or inversion of the uterus.<sup>1,9,11</sup> Diagnosis is made by failure to find a cleavage line in attempting traumatic manual removal of the placenta.

The treatment of choice for almost all patients is listed in standard texts as immediate abdominal hysterectomy once the diagnosis is made.<sup>1,9,12</sup> Muir<sup>12</sup> reported a case in which the placenta of a four and one-half month abortus could not be removed manually. There being virtually no bleeding, the patient was put to bed and given antibiotics. By eight weeks, uterine drainage had ceased. Two months later the patient became pregnant, going on to a normal delivery and third stage. Greenhill<sup>1</sup> cited 14 cases in which the placenta was allowed to remain intact without an attempt at removal. All 14 women survived. Others<sup>9,10</sup> urge conservative treatment when possible. It is recommended that the therapy chosen should depend on the amount of bleeding and the uterine response to complete or partial removal of the placenta. In complete accreta with little bleeding, the placenta should be drained of fetal blood and allowed to become organized and absorbed. With partial accreta too densely adherent to be removed, the uterus should be packed and treated expectantly. Unfortunately, even with adequate blood replacement this rarely suffices, and hysterectomy becomes the treatment of necessity. Israel, Siegel, and Rubenstone recommended that with combined placenta praevia-placenta accreta discovered at cesarean section, hysterectomy be done. The following case report describes an attempt at conservative therapy for partial accreta which failed, and for which hysterectomy was necessary.

#### CASE REPORT

A 26-year-old woman, gravida 2, para 1, whose estimated date of confinement was 30 June 1955, was admitted to the maternity ward of this hospital at 2100 on 10 July with a history of cramping pain in the lower abdomen of several hours' duration. The pain ceased soon after admission. The patient was discharged the following morning, to be seen shortly in the prenatal clinic. She was readmitted on 14 July at 2300, with the bag of waters having ruptured earlier at home.

The prenatal course was marked by a moderate degree of polyhydramnios and a marked diastasis recti abdominis. Blood pressure determinations and repeated urinalyses were always within normal limits.



Hematocrit on 7 July (one week prior to delivery) was 38 ml per 100 ml, with a hemoglobin of 12 g per 100 ml. A roentgenogram of the abdomen taken on 7 July revealed a single fetus, near term, in cephalic presentation, with an unusually large amount of fluid present.

The previous obstetric history was that of one previous pregnancy in 1954, highlighted by mild post-partum atony of the uterus, and death of the 7 lb 7½ oz newborn infant 32 hours after birth due to massive intracranial hemorrhage, secondary to a right tentorial laceration.

Uterine contractions began at 0200 on 15 July. The first stage of labor ended at 0600. A saddle block anesthesia, using 3 mg of Pontocaine (brand of tetracaine hydrochloride) was performed at 0610. However, it was concluded shortly thereafter that the patient was not ready for delivery. She was returned to the first-stage room to be kept under close observation. Fetal heart tones remained good, as did maternal pulse and blood pressure.

At about 0945, a posteroanterior and left lateral roentgenogram of the abdomen and pelvis were taken showing the fetus in right occiput transverse position at +2 station.

At 1015, 4 hours and 15 minutes of the second stage having elapsed since the saddle block anesthesia, the patient was returned to the delivery room. Blood was drawn for typing and cross-matching. An infusion of 5 per cent dextrose in water was started. Penicillin and streptomycin sulfate were administered intramuscularly. The blood pressure at 1015 was 94/50 mm Hg. The patient was prepared, draped, and catheterized, and anesthetized with a pudendal block using 1 per cent Xylocaine (brand of lidocaine hydrochloride). At 1035, 75 mg of Demerol (brand of meperidine hydrochloride) were given intramuscularly, putting the patient to sleep.

Manual rotation of the head was unsuccessful, as was the use of Simpson's forceps via the wandering technic. The patient was delivered with Kielland's forceps, using the inversion method of application, of an 8 lb 10 oz male infant. The baby was in fair condition. Normal respiration was established in approximately 40 seconds.

The mother was given a 1 ml-ampule of Pitocin (brand of oxytocin) intramuscularly after delivery, at 1127. A transfusion of blood (500 ml) was started at 1134. Blood pressure at this time was 108/70 mm Hg and the pulse 84. One hour of the third stage elapsed without spontaneous delivery of the placenta, prior to an attempt at manual removal. A portion of the placenta was removed piecemeal. It was impossible to find a line of cleavage for all of the placenta. One milliliter of Ergotrate (brand of ergonovine maleate) was given intravenously. A 6-cm cervical laceration of the anterior lip was repaired. At 1245 blood pressure was 90/60 mm Hg and the pulse 92. By 1410, 1,000 ml of whole blood and 500 ml of dextran had been administered. Excessive bleeding, after repair of the cervical laceration, was encountered and

felt to be due in large measure to uterine atony. The uterus was thoroughly packed in what proved to be an unsuccessful effort to treat the atony.

At 1500, the patient was taken to the operating room. The packing was removed, the uterus re-explored, and the diagnosis of placenta accreta was confirmed. In view of the marked uterine atony, with consequent extensive bleeding, a rapid total hysterectomy was performed under general anesthesia. Blood was replaced in adequate quantities. The patient left the operating room with a pulse of 84, and a blood pressure of 110/84 mm Hg.

On opening the specimen, an 8- by 8-cm portion of placenta was noted to be tightly adherent to the anterior wall of the uterus. A 2-cm laceration was present at the left lateral aspect of the lower uterine segment. The cervical laceration had been entirely repaired.

Postoperatively, the blood pressure and pulse were maintained within normal limits. Therapy included adequate fluid and electrolyte replacement, massive doses of antibiotics, and multiple blood transfusions. The patient received a total of 3,500 ml of whole blood during her hospital stay. Spiking temperatures were present until the fifth postoperative day. The patient was discharged on the tenth postoperative day in good condition.

The pathology report by William A. Meriwether, Captain, MC, USA (6th Army Area Medical Laboratory, Fort Baker, Calif.) and confirmed by the Armed Forces Institute of Pathology noted grossly an area of undetachable placenta adherent to the uterine wall. Microscopically, "cotyledons were lying adjacent to the uterine musculature, separated only by an occasional decidual cell" (figs. 1-3).

Final diagnosis: Placenta accreta, partial.

#### COMMENTS

As previously noted, conservative therapy for partial placenta accreta is rarely successful. The occasional success, however, warrants a trial in young women of low parity, provided the patient is closely observed and adequate blood replacement is at hand.

In the case reported, the uterine atony encountered was apparently due to a combination of factors, namely, overdistention of the uterus, a greatly prolonged second stage, too vigorous attempts at manual removal of the placenta, and possibly, the rent in the lower uterine segment. A previous obstetric history of traumatic delivery and post-partum atony indicated the need for cautious management of the second and third stages of labor.



Figure 1. Low power view of cotyledons lying adjacent to uterine musculature. ( $\times 100$ )

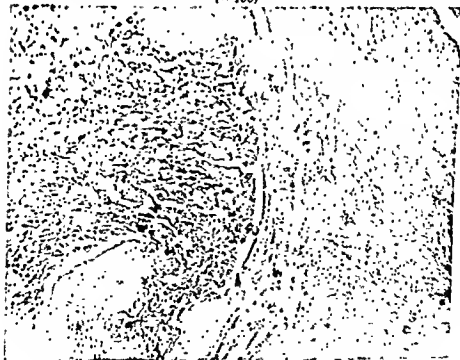


Figure 2. Medium power view of villi adjacent to uterine musculature. ( $\times 430$ )



Figure 3. High power view of villi adjacent to uterine musculature separated only by an occasional decidua cell.

### SUMMARY

A reported case of partial placenta accreta illustrates the fact that this condition usually warrants hysterectomy, total hysterectomy being the treatment of choice.

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### THE CASE FOR HYSTERECTOMY

When the health of a woman, physically and emotionally, is compromised by an abnormal uterus to a serious degree (and the judgment of this degree of disability is squarely on the shoulders of the conscientious surgeon performing hysterectomy), excision has proved one of the most satisfactory procedures in all surgery. The emotional confusion in consideration of the sexual organs, femininity, and procreation has prevented some from seeing or realizing the great importance of extending hysterectomy to those in dire need of it. Hysterectomy should never be performed for minor complaints and minor findings, but only when there are major diseases or when those complaints and findings add up to a major disability.

—LAMAR A. GRAY, M. D.  
in *A. M. A. Archives of Surgery*  
p. 500, Oct. 1954

# Spinal Cord Pseudotumor

## A Complication of Pantopaque Myelography

SARKIS S. SARKISIAN, *Commander, MC, USN*

WHEN radiopaque substances are injected into the spinal canal in myelography, an occasional local tissue reaction should be expected. Such a reaction was seen in a patient who had been evaluated for spinal cord tumor.

### CASE REPORT

A 39-year-old woman had first noted urinary stress incontinence following an episode of viral pneumonia. This symptom gradually became worse, and on 4 January 1956 a myelogram was done, using Pantopaque (brand of iophendylate). This was repeated on 2 February. No tumor was revealed by either of these examinations.

On 29 February the patient noted the onset of numbness over the sole of the left foot, in the perineum, and along the back of the left leg. The physical examination and past history supplied no other pertinent information. The neurologic examination showed slight hypalgesia of S3, S4, and S5 segments. The impression was: cauda equina lesion with cord compression. A third myelogram on 15 March was interpreted as showing a tumor at the L5-S1 level. The filling defect measured 1 by 3/4 cm and was constant, suggesting a spinal cord tumor in this area (fig. 1).

On 21 March a laminectomy of L5, S1, and S2 was performed. This revealed an inflammatory subdural tumor mass, as much as possible of which was removed. There was an uneventful recovery, and one month postoperatively the patient was much improved. The tumor (fig. 2) was a lipoid granuloma composed of fibroblastic cell proliferation, foreign-body-type giant cells, and "punched-out" areas representing lipoid material.

### DISCUSSION

Before Pantopaque was first used in clinical trials, Steinbausen and associates<sup>1</sup> studied its effects on dogs. They reported foreign body response when the oil was injected intrathecally, with encystment within about six weeks. When used in humans, Pantopaque has given excellent results generally. Marcovich, Walker, and Jessico<sup>2</sup> reviewed 150 cases in which iodized oil had been

used to examine the spinal cord and found no densities referable to the injection. Bering<sup>3</sup> reported on a series of 106 cases in which he used Pantopaque with no untoward results, except for a single case where the Pantopaque became fixed in one mass. Arbuckle, Sheldon, and Pudenz<sup>4</sup> and Peacher and Robertson<sup>5</sup> reported over 400 additional cases with no unusual findings.



Figure 1. Roentgenograms revealing constant filling defect at L5 and S1 level.

On the other hand, Camp<sup>6</sup> reported encystment of Pantopaque subsequent to myelography. Luco, Leith, and Burrage<sup>7</sup> described two cases of delayed noninfectious meningitis with spinal fluid findings of increased protein and inflammatory cells. Erickson and von Barron<sup>8</sup> reported a case presenting manifestations of late meningeal reaction with fatal termination, in which autopsy revealed a fibrinous exudate over the base of the brain and thoracic spinal cord, with microscopic evidence of widespread dispersion of oil.

Fine emulsification of the oil may introduce an additional hazard that must be considered during myelography. In fact, Jacger<sup>9</sup> showed that in dogs intrathecal injection of emulsified Pantopaque caused death in 10 minutes. It would seem that a bloody tap should be considered a contraindication for the injection of oil intrathecally, for blood can cause emulsification of the oil.



Figure 2. Photomicrograph of section of spinal cord lesion revealing typical lipoid granuloma. ( $\times 200$ ) (Medical Illustration Section, First Army Area Medical Laboratory)

### CONCLUSIONS

It is necessary to take precautions during any myelographic procedure when a foreign material is injected intrathecally. Injection of oil should be postponed in case of a bloody spinal tap. The iodized oil should not be emulsified with spinal fluid or other material. An attempt to remove as much of the iodized material as possible should be accomplished after completion of myelography. It should be remembered that injection of such materials can elicit local tissue proliferation as well as a systemic sensitivity response.

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#### TEACHERS OF MEDICINE

"One of the diseases of our society is this erroneous belief that the brave new world will come to pass by miracles of structural design and intricate organization alone. Plans there must be, but personalities must take precedence of plans. The basic essential is to ensure that medical students, both undergraduates and post-graduates, are associated with (not just taught by) those whose lives and work are examples of excellence in scholarship and professional skill. These teachers must be ever dissatisfied with their efforts, critical of themselves and others, forever scheming and striving to test the truth of what appears to be known, and planning to enlarge knowledge. Among such there is no room for the complacent, the arrogant, the staunch upholder of tradition, and the stout defender of the status quo. The quality of our teachers is all-important and a heavy responsibility rests on those who have to select the academic staffs and consultants responsible for medical education."

—V. MELVILLE ARNOTT, M. D.  
in *Lancet*, p. 785, Oct. 15, 1955

## A MESSAGE FROM THE A. M. A.

No project initiated by the American Medical Association in the past 10 years has received wider applause and support than its program of assistance to medical schools in financing their operations. The American Medical Education Foundation was established in 1950 to stimulate voluntary contributions from physicians for use in support of the nation's approved medical schools.

Following World War II, the medical schools faced an expanded enrollment and mounting operating costs. Their teaching programs had to keep pace with the rapid advance of medical science and the broadening concept of medicine's role in the community. The traditional sources of income were insufficient to meet the postwar rising costs and at the same time maintain the high standard of medical education in the United States. It was estimated that at least an additional \$10,000,000 each year was necessary to make up the deficits of the medical schools.

To meet this need, the A. M. A. sponsored the American Medical Education Foundation, which was incorporated to receive donations from individual physicians to help defray the costs of our present-day medical education system and to administer the allocation of these funds. The A. M. A. gave \$500,000, the first donation to the Foundation, and agreed to finance the costs of promotion and administration. As a result, the Foundation is one of the few organizations now raising funds in the United States whose *entire income in contributions goes to the cause for which funds are donated.*

During the past six years, the Foundation has received and distributed \$4,684,312 to medical schools. In 1955, more than 25,000 contributors made individual gifts to the Foundation. The A. M. A. has made grants totaling \$1,100,000, which the Foundation has distributed for the private support of medical schools. It has continued to pay all administrative costs, and exerts every effort to encourage and further the program.

Several policies were established by the Foundation with respect to contributions, one of them being a rule that no donations would be restricted as to use in the medical schools. This policy was necessary since many restricted grants made in prior

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From the Council on National Defense of the American Medical Association. The views and opinions expressed are not necessarily those of the Department of Defense.

—Editor

years could not properly be integrated into a medical school's program because of the limited administrative and housekeeping facilities of the school. Many deans have expressed their gratitude for this rule that permits freedom of utilization and thereby makes the actual grant worth many times its face value.

Another policy adopted early was the acceptance from physicians of donations specifically earmarked for the school of their choice. This was done so that full expression could be made of the physician's loyalty to his alma mater. The rule also permits the Foundation to co-ordinate its efforts with an active annual alumni giving program. Since 1953 the Foundation has served the medical schools as a clearing house for statistical information in regard to alumni giving. It has reported each year the amount of money given without restrictions directly to each of the medical schools by their alumni.

The success of the American Medical Education Foundation has largely been a result of the work done by physicians in the constituent and component societies of the A. M. A. Across the nation, state associations have appointed chairmen and committees who have made it their job to tell their colleagues about the importance of support for the medical schools. In the American way, each state has adopted a different attack to this problem. A number of state medical societies increased the dues of individual physicians and allocated the increase to the Foundation. Other state societies have a voluntary entry for the Foundation on their dues statement, and many of the societies give large donations from their state treasuries.

These generous contributions from the societies themselves are matched in many states by purely voluntary appeals made in an organized way at the local level. The importance of the program, however, does not reach everyone's ears at once; so it has been a steady effort in education to acquaint every member of the profession with the existence of the Foundation and its purposes. It is expected that within a short time, the \$2,000,000-a-year goal from the physicians of the nation will be reached.

One of the questions constantly asked is how this money is used. Unsought replies to this question pour in from the medical schools. Deans constantly write in gratitude to the Foundation, describing the importance of this source of income. One medical school dean was able to raise the salaries of his instructors enough to show them that the school was appreciative of their services and thus hold his faculty, whereas he had been in danger of losing them because he had no other source of income for these raises. Another dean reported that it would have been impossible for him to increase the seating capacity of several classrooms if it had not been for grants received from this source.

As the costs of everything spiral these days, and a greater touching burden is placed upon the medical schools by the expansion of medical knowledge, the support of the 82 medical schools of this country as they have always been supported, by the generosity of private philanthropy, must be continued. The nation's physicians must lead the way.

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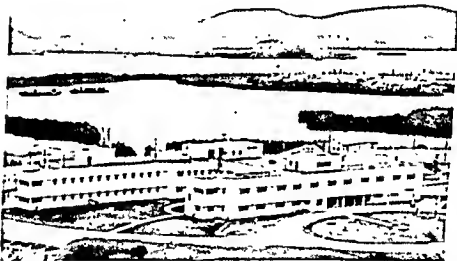
## DEATHS

HALE, Legao Owsley, Major, DC, AUS, of Big Clifty, Ky.; stationed at Fort Jackson, S. C.; graduated in 1946 from University of Louisville School of Dentistry, Louisville, Ky.; appointed First Lieutenant 10 May 1949 and called to active duty 25 May 1949; died 29 June 1956, age 37, at U. S. Army Hospital, Fort Jackson, S. C., of bilateral pneumonia with complications.

McCULLEY, Grace Elizabeth, Lieutenant Colonel, ANC, USAR, of Trenton, N. J.; stationed at U. S. Army Hospital, Fort Carson, Colo.; graduated in 1929 from Newark City Hospital School of Nursing, Newark, N. J.; appointed Second Lieutenant, ANC, 8 July 1942; died 2 July 1956, age 50, at U. S. Army Hospital, Fort Huachuca, Ariz., of hypertensive cardiovascular disease.

## NEW NAVAL HOSPITAL IN CUBA

The new 100-bed U. S. Naval Hospital at Guantanamo Bay, Cuba, was dedicated on 28 September 1956. The hospital cost \$2,500,000 exclusive of equipment, and is the first naval hospital to be completely air conditioned. It will replace the temporary building used for many years as the base hospital.



Among the distinguished guests present was Dr. F. B. Berry, Assistant Secretary of Defense (Health and Medical). During the ceremony Rear Admiral D. W. Hogan, Surgeon General, U. S. Navy, accepted the new structure with its latest medical facilities and then turned it over to Captain L. A. Newton, MC, USN, Commanding Officer. In dedicating the hospital the Surgeon General paid tribute to the men and women of the Medical Department of the Navy, saying:

"Here, again, we find—and I am most happy to remark on it—that this grand record in hospitalization in Cuba is due very largely to the magnificent examples of those medical men and women of the Navy who have here preceded us—their examples of love for the Navy, of zeal to advance themselves constantly in knowledge and proficiency, and of devotion to their duties—their example, which is possibly the most to their credit, of kindly consideration and encouragement for their patients.

"It is an anatomical fact, that the heart is halfway between the head and the hand. At the bedside of a sick or wounded bluejacket, the brainy mind of the doctor is very important; as, likewise, the deft and sensitive hand that holds the scalpel is a blessing to the patient, of



*Dedicatory address is presented by Rear Admiral Bartholomew W. Hogan, MC, USN, Surgeon General, U. S. Navy. Seated, left to right, are Captain Willard C. Calkins, MSC, USN, Director, Medical Service Corps Division, Bureau of Medicine and Surgery, Department of the Navy; Captain Leslie D. Ekvall, MC, USN, District Medical Officer, 10th Naval District; Captain Lyle A. Newton, MC, USN, Commanding Officer, U. S. Naval Hospital, Guantanamo Bay, Cuba; Doctor Frank B. Berry, Assistant Secretary of Defense (Health and Medical); and Rear Admiral William G. Cooper, USN, Commander, U. S. Naval Base, Guantanamo Bay, Cuba.*

vital and paramount value. Above these boons, however, is the supreme Godsend of a kindly heart, the balsam of a cordial smile, the reanimating transfusion the physician gives by his sincere and personal interest in his each and every patient. By passing from hand to hand such a torch of medical excellence, even better in the future than in the past, our Naval Medical Department will one day see fully realized, if not all, at least the majority of the zealous and onward aspirations that now signalize it. . . . I hereby dedicate this hospital to the physical, mental, and spiritual welfare of all military personnel and their dependents. It is furthermore dedicated to all mankind in times of possible disaster."

## THE NATIONAL LIBRARY OF MEDICINE

The Armed Forces Medical Library was transferred to the Public Health Service of the U. S. Department of Health, Education, and Welfare on 1 October 1957. The National Library of Medicine Act, signed by President Eisenhower on 3 August 1956, established a National Library of Medicine in the Public Health Service "to assist the advancement of medical and related sciences and to aid the dissemination and exchange of scientific and other information important to the progress of medicine and to public health." The Armed Forces Medical Library forms the nucleus of the National Library.

The Armed Forces Medical Library was founded in 1836 as the Library of the Surgeon General's Office, U. S. Army. It was one of the largest and most important medical libraries in the world. It contained almost a million volumes, representing literature on medicine, dentistry, pharmacy, and allied sciences in all languages and of all times. Its books were loaned to other libraries throughout the United States.

In administering the National Library of Medicine, the Surgeon General of the Public Health Service will be assisted by a Board of Regents consisting of 10 persons to be appointed by the President and confirmed by the Senate. Ex officio members of the Board are the Surgeons General of the Public Health Service, the Army, Navy, and Air Force; the Chief Medical Director of the Department of Medicine and Surgery of the Veterans' Administration; the Assistant Director for Biological and Medical Sciences of the National Science Foundation; and the Librarian of Congress. Colonel Frank B. Rogers, who was the Director of the Armed Forces Medical Library, is the Director of the National Library of Medicine.

The National Library of Medicine Act also authorizes the construction of adequate facilities to house the Library on a site to be selected by the Surgeon General of the Public Health Service at the direction of the Board of Regents.

# Promotions of Officers

The following officers of the military medical services on active duty

in the Navy have received temporary promotions to the rank indicated.

## MEDICAL CORPS

ALBERT, Harold M., Comdr., USN  
 ALLEBACH, Newton W., Comdr., USN  
 ALMODOVARACEVEDO, R. A., Comdr., USN  
 ALVAREZ, Jose A., Comdr., USN  
 AMBROGE, Paul, Comdr., USN  
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 BARIA, William H., Comdr., USN  
 BARONOFFSKY, Ivan D., Comdr., USN  
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 CUNNINGHAM, Robert E., Jr., Comdr., USN  
 CURTIN, Leo V., Comdr., USN  
 CUTLER, Garnet C., Comdr., USN  
 DARMSTAETTER, A. A., Jr., Comdr., USN  
 DAUGHERTY, Philip V., Comdr., USN  
 DAVIS, Harold A., Comdr., USN  
 DAVIS, Jasper W., Comdr., USN  
 DAVIS, John R., Jr., Comdr., USN  
 DAVIS, Tudor B. C., Comdr., USN  
 DAVIS, William D., Jr., Comdr., USN  
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 DEAS, Thomas C., Comdr., USN  
 DEMAILLY, Robert G., Comdr., USN  
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 OMMETTE, Robert M., Comdr., USN  
 OINEEN, James R., Comdr., USN  
 OIXON, David C., Comdr., USN  
 OCBING, Richard F., Comdr., USN  
 OREWE, Everett L., Comdr., USN  
 DROEGE, Fred O., Comdr., USN  
 OUNN, Adolphus W., Comdr., USN  
 EBY, Edwin G., Comdr., USN  
 ECHOLS, Raymond S., Comdr., USN  
 ELKIND, Maurice P., Comdr., USN  
 ELLIS, John V., Comdr., USN  
 ELSON, Ralph, Comdr., USN  
 ERRION, Arthur R., Capt., USN  
 ESWEN, John G., Comdr., USN  
 EVANS, Hills F., Comdr., USN  
 FEATHERSTON, John S., Comdr., USN  
 FEROVED, James W., Capt., USN  
 FITZGIBBONS, Robert J., Comdr., USN  
 FLACK, Hugh A., Comdr., USN  
 FLIESCHAKER, Robert J., Comdr., USN  
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 GAUDER, Peter J., Comdr., USN  
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 GEIB, Philip O., Comdr., USN  
 GELBIN, Ruchi M., Comdr., USN  
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 GOLDBLUM, Abraham D., Comdr., USN  
 GRANT, Benjamin F., Comdr., USN  
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 GREENBERGER, Sidney, Comdr., USN  
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 CUMMINS, John P. J., Jr., Comdr., USN  
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## Reviews of Recent Books

UNITED STATES ARMY IN WORLD WAR II. The Technical Services. The Medical Department: Hospitalization and Evacuation, Zone of Interior, by *Clarence McKittrick Smith*. 503 pages; illustrated. Prepared by the Office of the Chief of Military History, Department of the Army, Washington, D. C., 1956. For sale by the Superintendent of Documents, Government Printing Office, Washington, D. C. Price \$4.

This volume contains a detailed and lucid analysis of the complex problems that faced The Surgeon General in his efforts to administer the hospitalization and evacuation system of the Army in the Zone of Interior during World War II. Thus the problems dealt with are those of medical administration and logistics rather than those of clinical care. They were problems partly of his own making, but were in large part an inevitable corollary of those faced by a military organization—catapulted suddenly to 8 million strong—fighting a global war.

The narrative reflects the broad historical pattern of all the elements of the fighting organization in World War II: the initial unpreparedness—the early period of improvisation followed by attempts to clarify and standardize procedures—and the evolution of new policies and procedures to meet the changing requirements of global warfare.

The discussion is directed solely toward plans, policies, and operations at the level of Surgeon General of the Army, and the narrative "written from his vantage point." A delimitation of scope is necessary, but two observations are pertinent. First, this precludes any account of the viewpoint of the patient—1 individual out of a potential 8 million—caught up in the vast and impersonal "system" designed to maintain combat effectiveness. The reader misses the human element. Second, this delimitation has precluded more than an over-simplified statement of facts about situations peripheral to the Surgeon General's Office. For example, the bare statement that the Air Staff "remained nonetheless unconvinced of the wisdom or desirability of pressing for separate air forces hospitals generally" (p. 175), even in context, does not do justice to a complicated subject. The problem of how much to generalize is, of course, a thorny one for any scholar, and probably no two could ever agree on the exact balance to strike.

The organic structure of the volume is sound, and the complex narrative moves along smoothly. There is a great deal of attention given to detail and documentation which should be of value to future planners. The author has avoided the pitfall of partisanship, and in the mellowed perspective of time has treated colorful and controversial figures with impeccable restraint. This volume, along with other military medical volumes of the period, will form a basic reference library for the serious student or planner. —MAE M. LINK, *Pb. D.*

**ESSENTIALS OF DERMATOLOGY**, by *Norman Tobias*, M. D. 5th edition. 651 pages; 211 figures; 11 subjects in color. J. B. Lippincott Co., Philadelphia, Pa., 1956. Price \$8.

This textbook for medical students and general practitioners has been widely used since the first edition appeared in 1941. It does not pretend to exhaustively discuss the etiologic, physiologic, pathologic, diagnostic, and therapeutic aspects of diseases of the skin. It is a brief, practical, and useful text for the student and practitioner.

The book is well illustrated with both black and white and colored plates, and the printing is excellent. Organization of the subject matter is practical and useful. Particularly helpful to the nonspecialist is the section included in each chapter on those aspects of nursing that are particularly germane to the diseases considered.

The chapter on general therapeutic suggestions will prove to be a most helpful guide to the beginner.

Dr. Tobias again has succeeded in presenting a wide and difficult subject in a concise and readable form, yet complete enough for everyday use. This book is highly recommended for students of medicine and the nonspecialist — **VICTOR R. HIRSCHMANN, Col., MC, USA**

**SYMPOSIUM ON MYASTHENIA GRAVIS**. Papers read at the First International Conference on Myasthenia Gravis, at Philadelphia, Pa., on December 8-9, 1954, under auspices of The Myasthenia Gravis Foundation, Inc., New York. *Henry R. Viets, M. D.*, and *George D. Gammon, M. D.*, Guest Editors. 742 pages; illustrated. Distributed by The Myasthenia Gravis Foundation, Inc., New York, N. Y., 1955.

This symposium includes 18 manuscripts read at the First International Conference on Myasthenia Gravis at Philadelphia, 8-9 December 1954, under the auspices of the Myasthenia Gravis Foundation.

All the papers are rather brief and to the point. There is a statement of the clinical problem, followed by discussions of the pharmacologic aspects of neuromuscular transmission, pathophysiology of the disorder, the relation of the thymus to the disease, drug therapy and special features of management including thymectomy, myasthenic and cholinergic crises, and pregnancy in myasthenia gravis. The quality of this group of papers reminds one of the excellent series published on neuromuscular disorders by this same journal in 1953.

This symposium is recommended and should be useful to physicians who have the responsibility for the management of patients with myasthenia gravis. — **JOHN W. KEMBLE, Col., MC, USA**

**SYNOPSIS OF GYNECOLOGY**, Based on the Textbook *Diseases of Women*, by *Robert James Crossen, M. D.*, F. A. C. S. 4th edition. 255 pages; 132 illustrations, including frontispiece in color. The C. V. Mosby Co., St. Louis, Mo., 1956. Price \$5.25.

The author states in his preface that the synopsis is intended primarily as a less expensive volume for the student who does not wish

to purchase a larger, more detailed, and expensive textbook. It is also his intent to provide the general practitioner with a small and ready reference guide for the recall of basic principles in diagnosis and treatment of gynecologic disorders as encountered in daily practice.

These intentions have been successfully accomplished, and this book aptly fills an additional need which has been encountered by this reviewer; namely, for a very complete and general review of gynecology as would be desired by the general surgeon, particularly in the armed services, who may encounter few gynecologic conditions in his daily work. To the end that it supplies factual and handy statistical data and many excellent outlines and illustrations, it will serve the young teaching associate in gynecology as an excellent, quick pocket reference. The coverage of the field is most thorough while controversial points and full details are left to the larger text.

—JOHN A. PEASE, *Comdr., MC, USN*

**BRAIN MECHANISMS AND CONSCIOUSNESS**, A Symposium organized by The Council for International Organizations of Medical Sciences. Established under the joint auspices of UNESCO and WHO. Consulting Editors: *Edgar D. Adrian, Frederic Bremer, and Herbert H. Jasper.* Editor for the Council: *J. F. Delafresnaye, C. I. O. M. S., Paris, France.* 556 pages; illustrated. Charles C Thomas, Publisher, Springfield, Ill., 1954. Price \$8.50.

This symposium presents the combined efforts of outstanding research workers from the fields of neuroanatomy, neurophysiology, neurosurgery, psychiatry, and psychology to clarify the scientific knowledge surrounding the neurologic basis of conscious mental processes and behavior. The study utilizes a wealth of new data obtained by serious, painstaking research. Recognizing that communications between various scientific disciplines always present difficulties and that the problem of consciousness in its complexity will not at present yield a simple, common-sense analysis, each discussant in this symposium drives incisively to his points of value. All of the work done emphasizes the increasing importance of a complicated, integrating system between the cortex and subcortical formations, generally described as the centrencephalic system and composed of many topographic subcortical nuclei, association tracks, and diffuse arrangements of neurons.

Every physician and every research worker truly interested in the scientific understanding of the motivation of human behavior and the genesis of consciousness can gain greatly from a study of the various presentations. Particularly interesting to psychiatrists and psychologists will be articles on the psychological, psychiatric, and psychoanalytic aspects of the problem of consciousness by such outstanding research scientists as L. S. Kubie, D. McK. Rioch, H. H. Jasper, A. E. Fessard, K. S. Lashley, and others. Detailed neuroanatomic, neurophysiologic, and neuropathologic presentations by H. W. Magoun, G. Moruzzi, E. D. Adrian, W. Penfield, W. Grey Walter, and others will



greatly interest research workers concerned with resolving the location of consciousness.

Since "consciousness is a primary fact of existence" (D. O. Hebb) and one can only know "the inner world of consciousness directly, the outer world only by inference from the inner data" (J. C. Eccles), it must be recognized that an understanding of consciousness requires both the observer and the observed. This symposium provides a ring-side seat from which either the observed or the observer can truly delve into the mystery of consciousness. This publication should be readily available as a reference book wherever serious study of brain mechanisms and consciousness is carried on.

—LUCIO E. GATTO, Col., USAF (MC)

**ARTHIROPLASTY**, by St. J. D. Buxton, M. B., B. S. 126 pages; illustrated, J. B. Lippincott Co., Philadelphia, Pa., 1955. Price \$6.

This monograph is an attempt to cover the subject of arthroplasty of the various joints, including significant historical data and a review of recent contributions by other surgeons, and concluding with a cautious chapter of predictions on what the future holds. The bibliography is complete and includes most of the important literature on the subject.

Various joints are dealt with, but by far the greatest portion of the discussion is given to hip joint arthroplasty with the author submitting an evaluation of his own as well as other surgeons' results. His enthusiasm for the stem prosthesis with an acrylic head is not shared by a large number of orthopedic surgeons in the United States.

The chapters on the principles of postoperative treatment and rehabilitation are reasonably complete. The instructions are rather general and will be most helpful to those who are already acquainted with the trials encountered in the postoperative management of the reconstructed joint.

This monograph is recommended reading for orthopedists especially interested in the history of arthroplasty. The remainder makes interesting reading but falls somewhat short of being a classic reference work in the field.—CLIFFORD A. STEVENSON, Capt., MC, USN

**JOINT LIGAMENT RELAXATION TREATED BY FIBRO-OSSEOUS PROLIFERATION**, by George Stuart Hackett, M. D. With special reference to low back disability, trigger point pain and referred pain. 97 pages; illustrated. Charles C Thomas, Publisher, Springfield, Ill., 1956. Price \$4.75.

The author has presented in monograph form his views on the anatomy, etiology, pathology, diagnosis, and treatment of painful joints. Based on 16 years of experience in therapy, including administration of over 3,000 injections, he has concluded that both local and referred pain in low back disability and in that of other joints is due to ligamentous instability. The methods of accurate diagnosis and localization of the trigger points are clearly described and stressed. Phe-

nominal cures of all these conditions were obtained by the injection of these trigger points with a fibro-osseous proliferant, a wonderful procedure if it can be reduplicated by other physicians treating the same type of conditions.

The author has very adequately expressed his views and presented convincing evidence to support the soundness of his treatment but at times is repetitious. The book is satisfactorily illustrated with 17 black-and-white and line drawings.

The author has assumed that all physicians ignore the anatomy, function, and treatment of injuries to the ligamentous structure of joints. Although this may be an extreme view, too often the adequate treatment for ligamentous injuries is neglected. This results in complications which are considered and treated as separate entities without due regard to their primary cause.

This book should be read by every physician and be available for ready reference to every physician who treats the residuals of joint trauma.—JOSEPH W. BATCHEL, Col., MC, USA

THE MEDICAL DEPARTMENT OF THE UNITED STATES ARMY, Preventive Medicine in World War II. Volume III: Personal Health Measures and Immunization. 394 pages; illustrated. Prepared in the Historical Unit, Army Medical Service, Editor-in-Chief, Colonel John Boyd Coates, Jr., MC. Editor for Preventive Medicine, Ebbe Curtis Hoff, Ph. D., M. D. Office of the Surgeon General, Department of the Army, Washington, D. C., 1955. For sale by the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C. Price \$3.25.

This third volume in the series on "Preventive Medicine in World War II" covers the general field of health measures and immunization. The subject is broken down into chapters dealing with manpower selection, personal hygiene, clothing, nutrition, malnutrition and deficiency diseases, preventive psychiatry, accidental trauma, and immunizations.

The authors have, in narrative fashion, detailed the experiences, mistakes, and repetitive efforts of the past in relation to these various aspects of personal health measures. Each chapter is a condensation of a mass of reference material boiled down sufficiently to prevent the reader from becoming mired in detail. For those who wish to study the subject of each chapter in more detail the source material is listed accurately at the foot of each page.

Here in one volume reposes a wealth of information on the trials, errors, and accomplishments of the past which, but for their compilation in this book, would be lost to those responsible for planning for the future. Whether read by military or civilians, all of the chapters are interesting, and some are fascinating, not only in content but in style.

The chapter on clothing is introduced by an explanation of the physics and physiology involved in the control of temperature and

humidity problems as related to the body. A thorough understanding of this chapter by all medical and line officers will eliminate in the future much of the effective time lost in past wars from such related injuries as trench foot.

If this volume had not been compiled, it is conceivable that many of the mistakes of the past war would be repeated for lack of a single source of material on these subjects. In most chapters the experiences and developments are discussed in general and also in relation to war theaters. This is of additional aid to those seeking guidance in developing a global preventive medicine program.

—LESTER P. VEIGEL, Col., USAF (MC)

THE YEAR BOOK OF DRUG THERAPY (1955-1956 Year Book Series), edited by Harry Beckman, M. D. 560 pages; illustrated. The Year Book Publishers, Inc., Chicago, Ill., 1956. Price \$6.

This yearbook, published each January, is based on the material in journals received through the preceding August.

The book is divided into sections on antibiotics and sulfonamides, cardiovascular diseases, surgery, et cetera, and within each section articles concerning new drugs, new information about old drugs, or new therapeutic approaches to particular diseases are abstracted. Editorial footnotes call attention to particularly notable deficiencies of or value in the articles abstracted in an attempt to tie isolated findings together and to give a more complete therapeutic concept. Articles reinforcing or contradicting each other are frequently reviewed together editorially.

This format plus a good index make this book the best available reference or review. Its yearly publication ensures current information, and the large number of both domestic and foreign journals reviewed guarantees coverage of any particularly important innovations. The book should be in all medical libraries and is heartily recommended to all physicians, from internes to specialists.

—CHRISTIAN GRONBECK, Lt. Col., MC, USA

DISEASES OF THE LIVER, Edited by Leon Schiff, M. D., Ph. D., with the collaboration of 27 contributors. Foreword by Cecil J. Watson, M. D., Ph. D. 738 pages; illustrated. J. B. Lippincott Co., Philadelphia, Pa., 1956. Price \$16.

Advances in our knowledge of the liver, its diseases and their treatment, have been sufficient to warrant compilation in this sizable volume. The most important recent developments are said to be in the following fields: (1) knowledge of basic structure and function of the liver, (2) experimental production of liver disease, (3) viral hepatitis, (4) hepatic coma and nitrogen metabolism, (5) pathogenesis and treatment of cirrhosis, (6) treatment of hemochromatosis by phlebotomy, (7) copper metabolism in Wilson's disease, (8) needle biopsy of the liver, and (9) surgery for portal hypertension. Twenty-eight eminent workers have written on those aspects of liver disease in which they are well-

known experts. No single author could authoritatively cover all of this material before it became history. Dr. Schiff has so skillfully edited this book that it presents a balanced and thorough treatment of the subject, covering all important features without the omission of significant areas.

The gross and microscopic anatomy, physiology, and biochemistry of the liver are considered in 92 pages, followed by a chapter on experimental hepatic injury and three chapters on diagnosis and diagnostic tests and methods. The remaining 500 pages are devoted to disease entities and syndromes.

The focus of the book is predominantly clinical, and with few exceptions the contributors are persons whose daily activities devolve around the diagnosis and treatment of patients with liver disease. This book will be an extremely useful tool for anyone concerned with patients who have hepatic disease.

—BENJAMIN H. SULLIVAN, Jr., Col., MC, USA

A MANUAL OF FRACTURES AND DISLOCATIONS, by *Barbara Bartlett Stimson*, M. D., Med. Sc. D. 3d edition. 224 pages; 97 illustrations. Lea & Febiger, Philadelphia, Pa., 1956. Price \$4.50.

This book is a brief introduction to the subject of fractures and dislocations. It is written in an informal style with proper emphasis on conservative treatment of fractures, and occasionally indications are given for more radical intervention. The book is divided into a section on general treatment principles, followed by sections related to anatomic distribution of injury. Line drawings which are concise and clear are used as illustrative material, but methods mentioned in the text are not in all instances illustrated. This is especially true of the management of fractures by traction, and this discrepancy would lead to error unless other texts were used. Each fracture is briefly discussed as to diagnosis, etiology, incidence, treatment, and prognosis. It must be said, however, that in most instances the prognoses in patients with fractures are somewhat optimistic, and periods of immobilization for joint dislocations are unusually short. It is stated that a dislocated shoulder, for instance, need only be immobilized by a sling and swathe for a few days. This small text could serve well as an introduction to the treatment of fractures and dislocations for medical students and could be used as a guide for instruction. However, confronted with the problem of management of any specific fracture, one could hardly find enough material in this book and would be forced to seek other sources for guidance in definitive management.

—STERLING J. RITCHEY, Col., MC, USA

DISEASES OF THE LIVER AND BILIARY SYSTEM, by *Shelia Sherlock*, M. D. (Edin.). 720 pages; illustrated. Charles C Thomas, Publisher, Springfield, Ill., 1955. Price \$10.

In this clear and practical guide to hepatic and biliary disorders, the author, an experienced authority, has used the functional approach. Throughout, the emphasis is on the disturbance of liver (and biliary)

function, yet the laboratory is kept in proper balance with bedside observation.

There are numerous excellent illustrations, and the large type and attractive use of bold and italic faces make this book exceptionally easy to read.

A special word of thanks should be offered Dr. Sherlock because she has managed to describe a subject of great complexity with admirable simplicity. In fact, American authors could learn a great deal from a study of this model of English medical literature.

Because of the interrelations between the liver and all metabolic disturbances and because of the many types of primary and secondary hepatic disturbances the discussions are, in many instances, relatively brief. Nevertheless practically all the essential information is presented. Therefore, this book will certainly appeal to the student, house officer, and practitioner. The research investigator would use the book for a handy reference, although he may have to refer to experimental papers for certain details. The text can be strongly recommended to all readers.—S. O. WAIFE, Lt. Comdr., MC, USNR

**AN ATLAS OF OTOLARYNGIC PATHOLOGY.** By Colonel J. E. Ash, USA (Ret.), M. D., and Muriel Raum, M. D., Published under the joint sponsorship of the American Academy of Ophthalmology and Otolaryngology, The American Registry of Pathology, and The Armed Forces Institute of Pathology. 572 pages; 2,024 figures on 420 plates. American Registry of Pathology, Washington, D. C., 1956. Price \$20.

This is an extensive volume that covers a variety of lesions found in the general field of pathology in addition to diseases of the respiratory tract, neck, and ear. The format of the book is excellent, and for the most part the many black and white photomicrographs are clear and readily understandable.

The first part is devoted to a section on general pathology and presents a variety of subjects such as inflammation, pigmentation and degeneration, deficiency diseases, miscellaneous diseases of bone, and dermatoses. This section, I believe, could be deleted as it is adequately covered in the texts of general pathology readily available. However, on the whole the field of otolaryngic pathology is more extensively covered than could be found anywhere else. The plates on diseases and tumors of the ear are particularly good and well documented. This book will be a ready reference to the general pathologist as well as the otolaryngologist.—VERNON E. MARTENS, Capt., MC, USN

**ROENTGEN INTERPRETATION OF FRACTURES AND DISLOCATIONS,** by Joseph Levitt, M. D., and Ben Colloff, M. D. 265 pages; illustrated. Charles C Thomas, Publisher, Springfield, Ill., 1956. Price \$8.50.

In this first edition, a roentgenologist and an orthopedic surgeon have collaborated to produce a precise and practical guide to the reduction and immobilization of fractures. The title of the book is somewhat misleading. As stated in the foreword, the main purpose of the book is to

describe what constitutes generally accepted satisfactory reduction with emphasis on the important alignments to be restored or preserved as an aid to the roentgenologist.

The book serves as a handy reference of the essential normal x-ray anatomy of the more common sites of fracture and dislocation, the deformities usually produced by fracture or dislocation, the accepted position of reduction, and the usual time of immobilization. Methods of reduction, means of immobilization, and x-ray evidence of healing progress or complications are not included, except for several reproductions of roentgenograms demonstrating normal and abnormal healing progress in fractures of the femoral neck.

Aside from the 16 reproductions of hip roentgenograms, the parts are represented by diagrams which include only the essential anatomy and which are adequately labeled. Several errors in labeling are noted. Approximately 50 per cent of the text is devoted to the diagrams. Fractures of the skull and facial bones are not included. Fractures and dislocations of the spine are treated rather sketchily in a total of 18 pages as compared to 10 pages devoted to traumatic dislocation of the hip. Included as Appendix A are two pages of "bone age charts." Appendix B consists of five pages of line drawings of common appliances used in internal fracture fixation.

Although this volume is not intended as a complete reference book, it adequately serves the limited purpose intended by the authors.

—DELL F. DULLUM, Col., MC, USA

**CLINICAL ELECTROCARDIOGRAPHY, Part I, The Arrhythmias, With an Atlas of Electrocardiograms, by Louis N. Katz, M. D., and Alfred Pick, M. D. 737 pages; 415 illustrations. Lea & Febiger, Philadelphia, Pa., 1956. Price \$17.50.**

This text on arrhythmias constitutes Part 1 and presumably Volume 1 of others to follow on the subject of clinical electrocardiography by the authors. Much of the basic material is an expansion of that contained in the chapter on arrhythmias as published in the second edition of *Electrocardiography*, a text prepared by the senior author in 1946. The original material has been expanded to include advances and some of the newer concepts. Old illustrations and legends have been revised and many new ones have been added. New chapters dealing with dynamics of cardiac arrhythmias, principles of therapy, general aspect of block, and arrhythmias in the pre-excitation syndrome and those in the dying patient also have been added. Two useful appendices are added, the first concerning technic in the diagnosis of arrhythmias, the second containing a detailed coding system.

The contents are divided into two sections. Section 1, consisting of six short chapters, discusses the general aspects essential to prepare the reader for the detailed considerations of the individual disturbances of rhythm, which constitute Section 2. A bibliography is given at the end of Section 1 and at the end of each of the 10 chapters

constituting Section 2. The general plan of this book has been to separate the text from the illustrative electrocardiograms, the latter being placed at the end of each chapter. Each illustrative tracing has an extensive explanatory legend and can be used without reference to the text. The reader will find an analogue of most, if not all, of the records he is likely to encounter. Inasmuch as 497 pages are used solely for figures and legends, this publication is more of an atlas than a textbook.

There are disappointments in this new volume. In the theoretic discussions, the authors do not give due consideration to the unitary theory of origin of atrial arrhythmias. They ignore the existence of acceleration of conduction through the A-V nodal tissues, in spite of the fact that pages are given to discussion of delayed conduction through these same tissues. No reference is given in the extensive bibliographies to the recent work of Prinzmetal on these subjects. The authors apologize to some extent for this omission in the preface by stating: "We are well aware that some of the views expressed in this volume are not entirely in agreement with the concepts that are held by other serious workers in the field of arrhythmias." This, however, will not help the uninformed reader who will be unable to reconcile the terminology and ideas he reads in current literature with this "current text." Likewise, it is unfortunate that the terminology "auricular flutter and fibrillation" was used instead of the more correct and acceptable term of "atrial flutter and fibrillation."

—THOMAS F. MATTINGLY, Col., MC, USA

**OPERATIVE TECHNIC IN SPECIALTY SURGERY**, edited by Warren H. Cole, M. D., F. A. C. S., with 67 contributing authors. A Companion Volume to *Operative Technic in General Surgery*, published Oct. 1955. 2d edition. 967 pages; illustrated. Appleton-Century-Crofts, Inc., New York, N. Y., 1956. Price \$20. (\$37.50 for the 2-volume set).

This is the second edition of this fine work which covers the specialty fields of cardiovascular and thoracic surgery, plastic and reconstructive surgery, operative orthopedic surgery, neurosurgery, gynecologic surgery, and surgery of the male genito-urinary system. The greatest changes occur in the new edition in the fields of cardiovascular and thoracic surgery, and the chapter on plastic and reconstructive surgery has been greatly changed and improved.

In view of the present complexity in the fields of specialty surgery, the important function of a book of this type is to provide the general surgeon with a bird's-eye view of present operative methods, admitting that the minutiae and patient care cannot possibly be consolidated in one volume. The book has accomplished this objective in a superb manner. As such, it becomes a useful handbook for a general review of specialty surgery, and for beginning a more detailed study using the fine bibliography appended to each chapter.

The sections on thoracic surgical subjects include complete descriptions of modern operations on the heart, aorta, and lungs. Details

are given of such current technics as aortic resection, cardiac resuscitation, extracorporeal circulation, and repair of cardiac septal defects. Possibly the bird's-eye view of this important field could be improved by a modicum of editing. For example, the excellent sections on vascular injuries and pleuropulmonary operations could stand expansion at the expense of such items as the discussion of endo-aneurysmorrhaphy, of historic interest only, and the statistical polemic on results after operation for coronary artery disease. To me, the latter sections seem out of place in this kind of book.

The section on plastic and reconstructive surgery has been greatly enlarged and improved over the previous edition, and also includes a detailed description of general surgery of the neck.

This is an excellent edition, and of great value to the general surgeon. The quality of printing, binding, and halftone reproduction is excellent. It would be interesting to know whether the replacement of many of the halftone illustrations by suitable line drawings would reduce the price of this important volume to make it more readily available to the young surgeon in training.—LEWIS L. HAYNES, *Capt., MC, USN*

**Clinical Recognition and Management of DISTURBANCES OF BODY FLUIDS,**  
by *John H. Bland, M. D.* 2d edition. 522 pages; illustrated. W. B. Saunders Co., Philadelphia, Pa., 1956. Price \$11.50.

This is a genuinely useful book. In it Dr. Bland has logically assembled the great body of information now available on the behavior of water and electrolytes in health and disease. With this information he has attempted to formulate a "practical pathophysiologic interpretation of metabolic deviations of water, electrolyte, and hydrogen ion metabolism in all disease states for clinical utilization at the bedside." He has succeeded to a remarkable degree. Basic considerations are discussed in five chapters. Other entire chapters are devoted to separate discussions of fluid and electrolyte problems in relation to circulatory failure, liver disease, pediatrics, pulmonary disease, geriatrics, surgery, renal disease, effects of heat, diabetes mellitus, adrenal insufficiency, corticotropin and corticoids, central nervous system injury and disease, and problems related to physical stress such as roentgen irradiation.

Nomenclature and concepts have been simplified as much as possible without sacrifice of scientific accuracy. Even so, a considerable fund of specialized knowledge is necessary for intelligent reading. Dr. Bland makes a strong plea for increased use of bedside observation and clinical judgment in treating the type of problems dealt with here. In doing this, he makes statements which may appear to question the practical value of adjunctive laboratory means such as the flame photometer. This is regrettable but undoubtedly unintentional. Since these things are becoming increasingly available, even under relatively modest circumstances, it would be unfortunate if any clinician were discouraged from becoming sufficiently acquainted with them.



The author's style is clear and interesting, and he makes good use of the teaching device of repetition. Documentation is good and excellent tables, charts, and illustrations have been liberally provided. Many "cartoon" type illustrations are provided as a supplement to the text and the conventional diagrams. Indexing is adequate but could be improved by indexing authors separately. This book is highly recommended reading for all physicians and medical students.

—JOHN K. SPITZNAGEL, Lt. Col., MC, USA

**SUBPHRENIC ABSCESS**, by H. R. S. Harley, M. S., F. R. C. S. A Monograph in The Bannerstone Division of American Lectures in Surgery, edited by Michael E. DeBakey, M. D., and R. Glen Spurling, M. D. Thoracic Surgery Division, edited by Brian Blades, M. D. 216 pages; illustrated. Charles C Thomas, Publisher, Springfield, Ill., 1955. Price \$7.

This monograph is based on a study of the records of 188 patients suffering from subphrenic abscess and on a study of the literature. The subject matter concerns the author's concept of the anatomy of the subphrenic region. The pathway of infection to this region is explained and the way infection may spread across the diaphragm in either direction is discussed. The value of radiologic examination and the changes produced by an abscess under the diaphragm are described.

The symptoms, signs, and clinical varieties of subphrenic abscess and the other complications so commonly found in these patients are given lengthy consideration. Also the influence of complications on the clinical picture and on the mortality is stressed. The condition of subphrenitis without abscess formation, which gives rise to all the constitutional and local changes produced by a subphrenic abscess except those of a space-occupying lesion or of a gas-containing cavity, is described. Constitutional and local signs of infection may subside due to treatment with chemotherapeutic agents and do not recur. If resolution of the constitutional and local features of infection does not take place or if, after treatment is stopped, they recur, the presence of an abscess must be assumed, provided other complications are not present, and drainage should be instituted without delay.

Special reference to the importance of chemotherapy and to the route of drainage of subphrenic abscess is made. A plea for the universal adoption of extraperous approaches to the subphrenic spaces is made by showing the difference in mortality between the trans-serous and extraperous drainage.

The author has shown that, with early diagnosis, localization, and correct treatment, the mortality of subphrenic abscess should not exceed 10 per cent. This book summarizes the subject of, and the literature on, subphrenic abscess and is a ready reference for the treatment of the occasional case occurring in the experience of each physician and surgeon. The illustrations are good, and the book is adequately indexed and contains an excellent bibliography.

—HERBERT T. BERWALD, Col., MC, USA

COLLECTED PAPERS ON AVIATION MEDICINE. AGARDograph No. 6. Presented at Aeromedical Panel Meetings of the Advisory Group for Aeronautical Research and Development, Palais de Chaillot, Paris. Published for and on behalf of Advisory Group for Aeronautical Research and Development, North Atlantic Treaty Organization. 218 pages. Interscience Publishers, Inc., New York, N. Y., 1955. Price \$5.

This book is a compendium of 18 technical papers presented at several meetings of the Advisory Group for Aeromedical Research and Development (AGARD). The topics range all the way from Arctic survival problems to night vision. Eleven of the papers are reprinted from the Fourth Meeting of the Aeromedical Panel, which met in London in September 1953. Four of the papers are in French; the rest are in English.

It is difficult to consider the collection of papers as a book, as they have little in common. A more rational approach is to consider each paper on its own.

There is a very complete paper entitled "Tolerance to Abrupt Deceleration" by John Paul Stapp, including his protocols and several hitherto unpublished photographs. This makes this book a must for those interested in the subject of deceleration. The book is dominated by the 50 pages of text and 23 pages of illustrations devoted to this article.

Three of the authors are from the Royal Air Force Institute of Aviation Medicine at Farnborough. Ruffel Smith discusses aircraft cockpits from the anthropometric standpoint. There is a short article on the physiologic requirement of pressure cabins by Roxburgh, and an interesting article on rapid decompression by Fryer.

A paper entitled "Recent Advances of Instrumentation of Interest in Aviation Medicine" puts in one place the information on pressure transducers, spectrometric methods of gas analysis by quantitative emission spectroscopy, and the Rahn-Otis technic and other methods of intermittent and continuous sampling of expired air. Such diverse topics are considered from the standpoint of instrumentation rather than the resultant findings; it is a refreshing approach and one of interest to the student in the field. The article is well annotated with references and covers some 30 pages.

There is an interesting discussion by Van Wulffien Palthe on a test for detecting epilepsy—a simple paper and pencil test. In fact, he hints that the test may induce an attack in a latent epileptic.

There are general papers by such well-known men in aviation medicine as Benson, Grandpierre, Lo Monaco, and Bergeret; these emphasize the international nature of AGARD meetings.

The information contained in some of the papers has been published elsewhere. Nevertheless the book is worth buying. The paper by Stapp gives the book particular value to individuals and institutions who are interested in collecting literature in aviation medicine.

—VINCENT M. DOWNEY, Col., USAF (MC)

A TEXTBOOK OF ENDODONTOLOGY, by Edgar D. Coolidge, M. S., D. E. L.L. D. (Hon. Loyola), and Robert G. Kesel, D. D. S., M. S. 2d edn. 366 pages; 345 illustrations on 210 figures and 1 plate in color. L. Febiger, Philadelphia, Pa., 1956. Price \$7.50.

As stated in the preface, this volume was written because of desire of the author to present a text that will be helpful to both student and practitioner," and it offers the undergraduate dental student, general practitioner a clear, descriptive, and authoritative presentation of an important branch of health service.

The chapters devoted to therapeutics, dental caries, and the etiology of dental pain are lucid and well organized with excellent accompanying tables and illustrations. Of particular interest, especially to the military dental officer, is the chapter on dental pain experienced under conditions of low barometric pressure and during high-altitude flight both actual and simulated.

The chapters devoted to vital and nonvital pulps, partial and complete pulp removal, and the filling of root canals are written in detail, with descriptive illustrations and tables. In conjunction with the clinical procedures, there is a thorough coverage of the latest techniques and drugs in antibiotic therapy. This is followed by an excellent discussion of the biologic and clinical support of the theory of focal infection and pulpless teeth.

The information in this volume is of great value in the treatment of pulp pathology and root canal therapy. The book is a necessary reference for the libraries of general practitioners and clinicians at military and dental facilities who wish to have available a concise treatise on the subject of endodontology, with a well-balanced treatment of sound, logical theory and exact clinical procedures.

—JOHN R. McEVROY, Lt. Col., USAF (DC)

COLOR ATLAS OF ORAL PATHOLOGY, Histology and Embryology, Developmental Disturbances, Diseases of the Teeth and Supporting Structures, Diseases of the Oral Mucosa and Jaws, Neoplasms. Prepared under the auspices of the U. S. Naval Dental School of the National Naval Medical Center, Bethesda, Md. 158 pages; 461 figures in color. J. B. Lippincott Co., Philadelphia, Pa., 1956. Price \$12.

This concise book admirably fulfills its stated purpose to present, in pictures, basic knowledge which will lead to early diagnosis and treatment of diseases which occur in the oral cavity.

The chapters cover (1) a brief presentation of histology and embryology as they relate to selected normal tissues; (2) developmental disturbances; (3) diseases of teeth and supporting structures; (4) diseases of the oral mucosa and jaws; and (5) neoplasms. The bibliography cites numerous selected references for detailed study of the various oral diseases. There is an excellent topic index.

To accomplish his purposes, the author has used 461 superb illustrations, all of which are in color except for the roentgenograms. The

color plates include reproductions of transpatencies, sketches, and lithographs. Such profuse visual information provides precisely the aid needed by the clinician or student for swift diagnosis and proper treatment planning of all the oral diseases.

This book emphasizes the visual portrayal of clinical, roentgenographic, and microscopic appearances of the various oral diseases. Written material is brief and is confined to the page on which the entity is illustrated. The condensed information includes a concise definition of the condition illustrated and a short discussion of the pertinent local and general aspects.

The author is to be complimented highly for producing a compact book which has both reader interest and scientific merit. This atlas provides quick and authoritative information in a practical handbook so valuable it deserves a place in every dental library.

—KENNETH R. ELWELL, Col., USAF (DC)

THE YEAR BOOK OF NEUROLOGY, PSYCHIATRY AND NEUROSURGERY (1955-1956 Year Book Series). Neurology, edited by Roland P. Mackay, M. D. Psychiatry, edited by S. Bernard Wortis, M. D. Neurosurgery, edited by Percival Bailey, M. D., and Oscar Sugar, M. D. 576 pages; illustrated. The Year Book Publishers, Inc., Chicago, Ill., 1956. Price \$7.

This annual abstract of the current literature continues to be an important contribution as a time-saver to the student, the busy practitioner, and the specialist. It is gratifying that the recent literature reflects a more balanced and integrated approach to both neurophysiology and psychic functioning.

In the field of neurology, the editor feels that the development of an effective vaccine against acute anterior poliomyelitis was the outstanding event of 1955. There has been continued intensive work on the functions of the temporal lobe and the role played by the "visceral brain" in the behavior of the organism. That the temporal lobes are not the "seat of emotion" is apparent from investigations on the cingulate gyrus, the thalamus, the hypothalamus, and other areas. Encouraging progress is evident in the field of degenerative diseases, some of which, like progressive lenticular degeneration, may prove to be of metabolic origin and perhaps eventually amenable to therapy. Studies of the convulsive disorders reveal that electroencephalographic patterns are not readily translatable into clinical terms.

In the section on psychiatry, the year will be remembered as one of experimentation and clinical use of several new drugs. However, a difficult problem is a need for clearer criteria in the choice of drugs. One can predict with some assurance that newer and better anxiety- and tension-relieving drugs will soon become available and that fewer lobotomies will be done. Newer electric and ultrasonic devices will be more effective in the treatment of the mentally ill patient. However, much handicap is imposed on psychiatry and mental health programs by the deplorable lack of personnel and facilities. Hospital architecture

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and our clinical practices will soon be modified by new and important advances.

In the neurosurgical section, it is noteworthy that indiscriminate "psychosurgery" is justly deprecated. There is considerable improvement in the technic of angiography and ventriculography with the real possibility of lessening the morbidity in these procedures. Stereotaxic investigations continue, and there now exists the possibility of destruction of the hypophysis. There is no effective pituitary hormone for replacement of an absent hypophysis, although a combination of cortisone, testosterone, and thyroid extract seems to act fairly well.

The yearbook continues to fulfill its mission, and the usual high standards of reporting have been maintained in the current volume.

—RICHARD R. CAMERON, Col., MC, USA

**BING'S LOCAL DIAGNOSIS IN NEUROLOGICAL DISEASES**, by Webb Haymaker, M. D. With Chapters by Richard G. Berry, M. D., Bernard S. Epstein, M. D., and Paul I. Yakovlev, M. D. Translated, Revised, and Enlarged from the Fourteenth German Edition, 478 pages; 225 illustrations, including 9 in color. The C. V. Mosby Co., St. Louis, Mo., 1956. Price \$16.75.

This volume is a completely revised and enlarged edition of a venerable neurologic classic; the present edition is virtually a new book due to an exhaustive revision in the light of the latest information.

The popularity of the method of presentation of this 478-page work is illustrated by the fact that Bing's first volume on local neurologic diagnosis was published in 1911 and has survived many editions, both in English and the original German.

The present edition covers in detailed fashion the localization of lesions of all parts of the central nervous system. A very large bibliography is included, and there are 225 well-selected photographs and diagrams. Brief sections on roentgenography and electrical methods of diagnosis are presented, apparently only to indicate the value of these methods, since this material is very sketchy and incomplete.

The sections on localization of lesions of the brain stem and cranial nerves and the detailed consideration of the many arterial occlusive syndromes are considered especially praiseworthy. The information is presented in rather dogmatic fashion, and there are those who will disagree with some of the conclusions reached. However, such material can hardly be useful if presented in an argumentative fashion, and the opinions are based upon the most generally accepted knowledge.

The main value of this book is to serve as a reference for making anatomic diagnoses in neurologic cases, and to give meaning to the many neurologic signs and symptoms encountered in clinical work. The practicing neurologist or neurosurgeon will probably keep it on his desk. It will also be extremely useful for any neurologically minded medical scholar who wishes to locate central nervous system lesions.

—ARTHUR L. SCHULTZ, Capt., MC, USN

## New Books Received

Books received by the *U. S. Armed Forces Medical Journal* are acknowledged in this department. Those of greatest interest will be selected for review in a later issue.

- TEXTBOOK OF BIOPHYSICAL CHEMISTRY, by *Eduard Staunton West*, Ph. D. 2d edition. 399 pages; illustrated. The Macmillan Co., New York, N. Y., 1956.
- AN ATLAS OF ANATOMY, by *J. C. Bosleau Grant*, M. C., M. B., Ch. B., F. R. C. S. (Edin.). 4th edition. 8½ by 11 inches in size. 556 pages; 714 figures, in color, arranged in the regional manner. The Williams & Wilkins Co., Baltimore, Md., 1956. Price \$15.
- REHABILITATION TRENDS—MID CENTURY TO 1956. 96 pages; illustrated. *Institute for the Crippled and Disabled*, New York 10, N. Y., 1956. Price, 1-10 copies, \$2.00 each; 11 or more copies, \$1.85 each, plus a mailing and handling charge of 20 cents per copy, within the continental limits of the U. S. A.
- Williams OBSTETRICS, by *Niebolson J. Eastman*. 11th edition. 1,212 pages; illustrated. Appleton-Century-Crofts, loc., New York, N. Y., 1956.
- NERVE IMPULSE, Transactions of the Fifth Conference, September 20, 21, and 22, 1954, Princeton, N. J., edited by *David Nachmansohn*, M. D., and *H. Houston Merritt*, M. D. 256 pages; illustrated. Josiah Macy, Jr. Foundation, New York, 1956. Price \$4.50.
- PSYCHOLOGY, PSYCHIATRY and the PUBLIC INTEREST, edited by *Maurice H. Kroust*, Ph. D. 217 pages. University of Minnesota Press, Minneapolis, Minn., 1956. Price \$4.
- ATHLETIC INJURIES, Prevention, Diagnosis and Treatment, by *Augustus Thorndike*, M. D. 4th edition. 252 pages; 113 illustrations. Lea & Febiger, Philadelphia, Pa., 1956. Price \$4.50.
- A Manual of the COMMON CONTAGIOUS DISEASES, by *Philip Moen Stirson*, M. D., and *Horace Louis Hodes*, M. D. 5th edition. 624 pages; 84 illustrations and 10 plates, 8 in color; 16 tables. Lea & Febiger, Philadelphia, Pa., 1956. Price \$8.50.
- ENVIRONMENT AND THE DEAF CHILD, by *Steven Getz*, Ph. D. 173 pages. Charles C Thomas, Publisher, Springfield, Ill., 1956. Price \$3.75.
- GROUP PROCESSES, Transactions of the Second Conference, October 9, 10, 11, and 12, 1955, Princeton, N. J., edited by *Bertram Schaffner*, M. D. 255 pages; illustrated. Josiah Macy, Jr. Foundation, New York, N. Y., 1956. Price \$3.50.
- BASIC READINGS ON THE MMPI IN PSYCHOLOGY AND MEDICINE, edited by *George Schlager Welsh* and *W. Grant Dahlstrom*. 656 pages. University of Minnesota Press, Minneapolis, Minn., 1956. Price \$8.75.
- FUNDAMENTALS OF CHEMISTRY AND APPLICATIONS, by *Charlotte A. Francis*, A. M., and *Edna C. Morse*, R. N., A. M., Ed. D. 4th edition. 543 pages; illustrated. The Macmillan Co., New York, N. Y., 1956.



- PSYCHIATRIC RESEARCH REPORTS 5**, of the American Psychiatric Association. "Research Techniques in Schizophrenia." Edited by Members of the Committee on Research, 1955-1956, Jacques S. Gottlieb, M. D., Chairman. Papers presented at the APA Mid-Atlantic Regional Research Conference, Georgetown University School of Medicine, Department of Psychiatry, Washington, D. C., March 9-10, 1956. 153 pages; illustrated. Published by American Psychiatric Association, Washington 6, O. C., June 1956. Price \$2.
- THE PRACTICE OF MEDICINE**, edited by Jonathan Campbell Meakins, C. B. E., M. D., LL. D., D. Sc. 6th edition. 1,916 pages; 318 illustrations, including 4 in color. The C. V. Mosby Co., St. Louis, Mo., 1956. Price \$16.
- THE MEDICAL CLINICS OF NORTH AMERICA**, Symposium of Specific Methods of Treatment. Consulting Editor, Michael G. Wohl, M. D. Pages 1259 to 1572; illustrated. W. B. Saunders Co., Philadelphia, Pa., 1956. Price \$4.
- ETIOLOGIC FACTORS IN RENAL LITHIASIS**, compiled and edited by Arthur J. Butt, B. S., M. O., F. A. C. S. 400 pages; illustrated. Charles C Thomas, Publisher, Springfield, Ill., 1956. Price \$12.50.
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# UNITED STATES ARMED FORCES MEDICAL JOURNAL

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## Monthly Message

This is a translation of an early Hindu medical oath of unknown origin:

YOU MUST BE CHASTE AND ABSTEMIOUS . SPEAK THE TRUTH . NOT EAT MEAT .. CARE FOR THE GOOD OF ALL LIVING BEINGS . DEVOTE YOURSELF TO THE HEALING OF THE SICK EVEN IF YOUR LIFE BE LOST BY YOUR WORK . DO THE SICK NO HARM , NOT , EVEN IN THOUGHT . SEEK ANOTHER'S WIFE OR GOODS , BE SIMPLY CLOTHED AND DRINK NO INTOXICANT . SPEAK CLEARLY , GENTLY , TRULY , PROPERLY . CONSIDER TIME AND PLACE . ALWAYS SEEK TO GROW IN KNOWLEDGE .. DO NOT TREAT WOMEN EXCEPT THEIR MEN BE PRESENT . NEVER TAKE A PRESENT FROM A WOMAN WITHOUT HER HUSBAND'S CONSENT . . WHEN THE PHYSICIAN ENTERS A HOUSE ACCOMPANIED BY A MAN SUITABLE TO INTRODUCE HIM THERE , HE MUST PAY ATTENTION TO ALL THE RULES OF BEHAVIOR IN DRESS , DEPORTMENT , AND ATTITUDE .. ONCE WITH HIS PATIENT , HE MUST IN WORD AND THOUGHT ATTEND TO NOTHING BUT HIS PATIENTS CASE AND WHAT CONCERNS IT .. WHAT HAPPENS IN THE HOUSE MUST NOT BE MENTIONED OUTSIDE . NOR MUST HE SPEAK OF POSSIBLE DEATH TO HIS PATIENT , IF SUCH SPEECH IS LIABLE TO INJURE HIM OR ANYONE ELSE ... IN FACE OF GODS AND MAN . YOU CAN TAKE UPON YOURSELF THESE VOTS . MAY ALL THE GODS AID YOU IF YOU ABIDE THEREBY . OTHERWISE MAY ALL THE GODS AND THE SACRA . BEFORE WHICH WE STAND . BE AGAINST YOU . AND THE PUPIL SHALL CONSENT TO THIS . SAYING . SO BE IT

*Frank B. Berry*

FRANK B. BERRY, M. D.  
Assistant Secretary of Defense  
(Health and Medical)

Quoted from *The Peaks of Medical History*, by Charles L. Dana, Paul B. Hoeber, Inc., New York.

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## Foreword

The *United States Armed Forces Medical Journal* is the medium for disseminating information of administrative and professional interest to all medical personnel of the Department of Defense. The Assistant Secretary of Defense (Health and Medical) and the Surgeons General of the several services invite all medical officers, dental officers, Medical Service Corps officers, Nurse Corps officers, and officers of the Veterinary Corps of the Armed Forces, and the medical consultants of the Army, Navy, and Air Force to submit manuscripts for publication in this *Journal*.

FRANK B. BERRY, M. D.,  
*Assistant Secretary of Defense (Health and Medical).*

MAJOR GENERAL SILAS B. HAYS,  
*Surgeon General, United States Army.*

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*Surgeon General, United States Navy.*

MAJOR GENERAL DAN C. OGLE,  
*Surgeon General, United States Air Force.*

# UNITED STATES ARMED FORCES MEDICAL JOURNAL

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## ACUTE RESPIRATORY ILLNESS CAUSED BY ADENOVIRUSES

### A Military Problem

MAURICE R. HILLEMAN, *Ph. D.*

**T**HE ACUTE respiratory illnesses of man present a major medical problem to the armed services in time of peace and more prominently in time of war. The magnitude of the problem in the U. S. Army during the last World War is illustrated in the example cited by Duff:

During the period of World War II, 1942-1945, from a mean strength of 6,076,135 there were 4,086,562 admissions for common respiratory disease recorded by the United States Army. The average time lost from duty by a person admitted for treatment of common respiratory disease during this period was 6.5 days . . . . The 4,086,562 cases admitted during the war period thus resulted in approximately 26.5 million man-days lost from duty, or approximately 18,000 each day of the war. An Army division is composed of 15,000 personnel. Thus, more than equivalent strength of one Army division were absent from duty every day of the war because of the common respiratory diseases.<sup>1</sup>

During World War II, the members of the Commission on Acute Respiratory Diseases conducted extensive investigations of the respiratory illnesses of soldiers in an effort to delineate the clinical syndromes and to elucidate the causes wherever possible.

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Certain portions of this paper were presented before the Military Preventive Medicine Section at the 105th Annual Meeting of the American Medical Association, Chicago, Ill., on 14 June 1956.

From Walter Reed Army Institute of Research, Washington, D. C.

These workers<sup>2-4</sup> observed that, aside from respiratory illnesses caused by bacteria or known viruses or from the common cold, there remained a large bulk of acute respiratory illnesses of unknown causation. These belonged in the general category of "febrile catarrhs" differentiated from influenza by Stuart-Harris, Andrewes, and Smith<sup>5</sup> in 1938. The members of the Commission recognized at least three distinct clinical entities among the cases of "febrile catarrh" which they referred to as undifferentiated acute respiratory disease (ARD), nonstreptococcal exudative pharyngitis, and primary atypical pneumonia (PAP). They demonstrated the separate causes of ARD, PAP (associated with the development of cold agglutinins), and the common cold based on the results of transmission experiments<sup>6,7</sup> in human volunteers by employing filtered throat washings from patients. In further epidemiological studies, it was shown<sup>8,9,10</sup> that epidemics of ARD occurred in recruits but not in "seasoned" men and that immunity seemed to follow this infection.

### CAUSES

During and following World War II, numerous attempts were made to recover the virus of ARD in experimental laboratory hosts but none was successful. During 1953, human cell tissue culture was first applied to the problem, and this resulted in the independent discovery by Rowe and associates<sup>1</sup> and by Hilleman and Werner<sup>10</sup> of a new family of viruses which inhabit the respiratory tract of man. The viruses (adenoid degenerative or AD) of Rowe and co-workers<sup>1</sup> were recovered as "masked" agents from surgically removed human adenoidal tissue being cultivated in tissue culture. The respiratory infection agents (RI) discovered by Hilleman and associates,<sup>10,11</sup> which included types now designated 3, 4, and 7, were recovered from throat washings of military patients with ARD or PAP in an epidemic. The prototype strain RI-67, as well as other viruses recovered in the epidemic, were shown by serologic methods to be related causatively to the disease in the recruits. Following this, Dingle and associates<sup>11,12</sup> showed by retrospective serodiagnosis that the RI-67 virus was related to cases of ARD which occurred among soldiers during World War II.

The new family of respiratory viruses has been designated by several names in the past. Huebner and associates<sup>14</sup> and Rowe and co-workers<sup>15</sup> have used the name adenoidal-pharyngeal-conjunctival (APC) viruses. Hilleman and associates<sup>10,11,12</sup> referred to these agents as the RI family of viruses and Ginsberg and co-workers<sup>13,17</sup> designated certain of the agents as ARD viruses. More recently a new name, Adenovirus,<sup>18</sup> was adopted by the principals working in this field, and it was agreed that the previous designations of RI, APC, and ARD be no longer used.

Huebner and associates<sup>14</sup> and others<sup>11,13,19-21</sup> have shown that there are at least 14 distinct serotypes among the agents of the Adenovirus family. These serotypes are readily distinguished by the serum neutralization technique employing monotypic rabbit antisera. On the other hand, all the types of virus elaborate a common group-specific "soluble" complement-fixing antigen<sup>10,24,25,22,23</sup> which can be separated readily from the virus by filtration or centrifugation procedures. Morphologically, the type 4 RI-67 and type 2 AD-6 strains have been shown to resemble influenza virus and to consist of spherical elementary bodies around 100 m $\mu$  in diameter.<sup>22</sup> The CF antigen is of smaller size.

### CLINICAL FINDINGS

The clinical findings in patients with acute respiratory illness caused by the Adenoviruses indicate that all segments of the respiratory tract may be affected, the symptoms and signs in any particular patient depending upon the degree of damage and the location of the areas involved. In a recent study by Dascomb and Hilleman<sup>14</sup> of 45 proved cases of acute respiratory illness caused by the Adenoviruses (predominantly or entirely type 7 virus) in newly recruited soldiers, it was observed that the most prominent clinical features were fever, pharyngitis, and severe cough. These were accompanied by constitutional symptoms such as headache, malaise, chills, myalgia, and dizziness which were usually mild. About half the patients developed discrete or confluent patches of nonbacterial white exudate on the hyperplastic lymphatic tissue in their throats, and the majority exhibited a coryzal feature. Laryngitis with hoarseness was a common complaint. Bilateral conjunctivitis and lymphadenopathy of the head and neck region were commonly observed among the patients studied. Lower respiratory tract involvement consisting of tracheobronchitis and bronchiolitis was a frequent finding, and about 16 per cent presented roentgenographic evidence of pneumonitis. The mean maximum temperature in the patients was about 103°F, and the fever lasted approximately 6 days on the average. The average hospital stay was around 10 days.

These disease conditions are commonly referred to as grippé, catarrhal fever, virus pneumonia, acute pharyngitis, or severe colds. More specifically, they belong in four respiratory disease entities established by the Commission on Acute Respiratory Diseases<sup>2-4</sup> during World War II [*viz.*, undifferentiated acute respiratory disease (ARD), nonstreptococcal exudative pharyngitis, bronchitis resembling atypical pneumonia (Br-AP), and primary atypical pneumonia (PAP) (unassociated with the development of cold agglutinins)] and the syndrome of pharyngocconjunctival fever described more recently by Parrott and co-workers<sup>24</sup> and by Bell and others.<sup>25</sup> Collectively, these entities belong in the syndrome of febrile catarrh established in 1938 by Stuart-Harris, Andrewes,



and Smith to distinguish an illness having catarrhal aspects but otherwise resembling influenza. Kjellen<sup>26</sup> in Sweden has shown that viruses of the Adenovirus family may be involved also in certain cases of mesenteric lymphadenitis, and Jawetz and associates<sup>20</sup> have presented evidence implicating the Adenoviruses in patients with keratoconjunctivitis. The Adenoviruses do not appear to be associated with the ordinary common cold in which there is a watery discharge with little or no fever,<sup>10, 13, 16, 17</sup> with primary atypical pneumonia in which the test for cold or Streptococcus MG agglutinin becomes positive,<sup>10, 13, 16, 17, 22, 27</sup> with psittacosis or ornithosis, with Q fever, or with influenza A, B, and C.

There is no specific therapeutic treatment for Adenovirus infections.<sup>14</sup> The therapy of the disease is symptomatic and may include steam inhalation, codeine, aspirin, bed rest, and adequate fluid intake.

### LABORATORY DIAGNOSIS

Reliable laboratory test procedures have been developed for diagnosis of infection with the Adenoviruses.<sup>10, 17, 28</sup> These involve either (a) the demonstration of a significant increase in amount of complement-fixing (CF) or neutralizing antibody against the virus in the patient's serum during the progress of the disease or (b) the recovery and identification of the causative agent. Antigen employed for performance of the CF test is prepared from tissue cultures infected with an Adenovirus, usually RI-67.<sup>10, 28</sup> The "soluble" antigen active in such material is sufficiently group-specific so that antigen prepared from a single type will suffice to detect infection with any of the known types.<sup>11, 15, 28</sup> The demonstration of a fourfold or greater increase in CF antibody in the patient's serum during convalescence (two weeks after onset) as compared with the acute phase specimen is considered to be of diagnostic significance. For serodiagnosis by the neutralization procedure, the titer of viral "inactivating" antibody in the acute and convalescent (three weeks after onset) serum samples is determined in tissue cultures. As in the CF test, a fourfold or greater increase in antibody level is diagnostic, but a "battery" of different serotypes must be employed because the serologic response in most patients usually is markedly type-specific against the homologous infecting strain.

At the present time, types 3, 4, and 7 virus appear to suffice for diagnosis of the military cases.<sup>12, 21</sup> The majority of the cases reported in civilian groups are type 3.<sup>27, 24, 25</sup> For virus recovery attempts, the patient's throat washings are inoculated into appropriate human cell tissue cultures and the recovered agents are identified in neutralization or CF tests with known positive anti-

sera. Virus usually can be isolated from 25 to 50 per cent of all patients who have Adenovirus illness proved by serologic procedures. The virus recovery and serum neutralization tests, which must be carried out in tissue culture, are necessarily laborious and expensive and are therefore limited to research laboratories. The relatively simple *in vitro* CF test, on the other hand, is best suited for routine diagnosis where the identification of the particular infecting type is unnecessary.

### EPIDEMIOLOGY

Respiratory illness caused by the Adenoviruses is widespread in military populations, primarily among newly inducted soldiers.<sup>10,11,12,17,21,22,27,28</sup> The illness is far less common among "seasoned" troops than in recruits.<sup>27,29</sup> The disease occurs in epidemic form throughout the year but is most prevalent during the winter months, when it may account for as many as 9 of every 10 hospitalizations for respiratory illness in recruit training camps.<sup>22,27,29</sup> This occurrence in all seasons is in striking contrast to that of influenza, which is epidemic only during the winter and is seldom encountered during other times of the year. The year-round prevalence of Adenovirus infections indicates that the virus resides continuously in the human population and that at least one means for perpetuating the disease is by contact with patients. The epidemic pattern<sup>29</sup> of outbreaks of Adenovirus respiratory disease in individual companies of soldiers during a period of high prevalence in the camp is, like that of influenza, explosive in nature, having reached the peak by the third week after the men were inducted into the Army. The over-all occurrence of the disease on the post, however, appears as a continuous curve which is a summation of the series of outbreaks in the individual training companies.

The importance of respiratory illness caused by the Adenoviruses to the armed services is reflected in the high proportion of soldiers who develop the clinical disease during their basic training period. The findings of a recent study<sup>29</sup> of the incidence of Adenovirus infections among recruits made at Fort Dix, N. J., indicate that approximately 80 per cent of the recruits who took their basic training at this post during the winter of 1954 acquired Adenovirus infection during their first 8 weeks in the Army and only 20 per cent escaped without infection. The Adenovirus infections acquired during this period were almost equally divided between recruits who manifested clinical respiratory disease and those who had inapparent infections or illness so mild that the soldier did not seek medical care. Among those who became sick, roughly half had an illness severe enough to require hospitalization while that of the remaining individuals was relatively mild and was treated on an outpatient basis at the dispensary. Similar studies of recruits who received their basic training

in the summer showed that a much smaller percentage acquired Adenovirus infections and only 10 per cent became infected. The relative proportion of patients who were hospitalized with mild or inapparent cases, however, remained roughly the same as during the winter months.

Further investigations by our group to determine the economic importance of Adenovirus respiratory disease in military personnel were conducted by laboratory study of a representative sample of patients with acute respiratory illness hospitalized at Fort Dix, N. J., during the period from June 1954 through May 1955. During this time, approximately 15,000 admissions were recorded, of which about 10,000 were for respiratory disease. Based on the laboratory test results, about 60 per cent of the recruit respiratory disease, or an estimated 6,000 cases, were caused by the Adenoviruses. The hospital stay for such patients may average around 10 days,<sup>16,17</sup> thus resulting in about 60,000 days of hospital care and man-days lost. It has been estimated<sup>18</sup> that the average cost per day for medical care in a station hospital such as Fort Dix is \$20.31 and the daily cost per man-day in the service during the first 25 weeks in the Army is \$14.65 (excluding the allowance for medical care). Based on these figures, the total cost of Adenovirus disease among the recruits in this single recruit training base at Fort Dix may be estimated to approximate \$2,000,000 per year. Added to this are the costs for repeat training and such less tangible factors as the burdens imposed by disruption of the troop training program.

Even though the viruses of the Adenovirus family comprise at least 14 distinct immunological types, only 3 of these, types 3, 4, and 7, have been found important in military populations.<sup>11,21</sup> Among the cases, roughly 40 per cent appear to be caused by type 4, 40 per cent by type 7, and only 20 per cent by type 3 virus. These findings are in marked variance with those found in civilian populations, in which type 3 has been predominant and types 4 and 7 only rarely encountered.<sup>22,24,25</sup> The reason for this difference between military and civilian groups is not known.

### PREVENTION

The economic importance of acute respiratory illness caused by the Adenoviruses to the military in time of peace and its more serious consequences during periods of mobilization for war make it expedient that some method be developed for its prevention. Studies to develop an effective Adenovirus vaccine have been in progress in several laboratories. Huobner and associates<sup>21</sup> have reported that volunteers injected with a heat- or formalin-treated preparation of type 3 virus grown in tissue culture developed neutralizing antibody against the agent. Further, this vaccine afforded significant protection against the experimental

disease which resulted from challenge with type 3 virus onto the conjunctivae of the volunteers.

Recently, our laboratory at the Walter Reed Army Institute of Research recorded the development, preparation, and field evaluation of a formalin-killed Adenovirus vaccine prepared from monkey kidney tissue culture.<sup>11</sup> This vaccine contained the two Adenoviruses, types 4 and 7, found predominantly in the military setting. It proved highly effective in the prevention in recruits of acute respiratory illnesses caused by the Adenoviruses.

The field evaluation of the vaccine was made at Fort Dix during the winter of 1955-1956, at a time when more than 90 per cent of all cases of respiratory illness in hospitalized recruits were caused by the Adenoviruses and when the predominant virus types were 4 and 7. The findings (fig. 1) showed, as might be

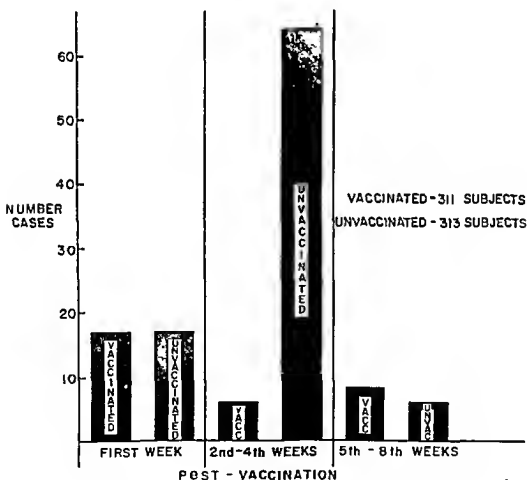


Figure 1. Relation of hospitalizations for acute respiratory illness to time of vaccination.

expected, that the vaccine did not prevent illness during the first week after vaccination. However, during the second, third, and

fourth weeks following vaccination, the incidence of respiratory illness in the vaccinated group was only one eleventh of that in the nonvaccinated controls. After the fourth week, the incidence fell to low levels, and no significant difference was found in the incidence in the vaccinated and control groups. By giving the vaccine as soon as possible after recruits are inducted into the Army, it should be possible to prevent most of the respiratory disease caused by the Adenoviruses which, as previously noted, occurs during the first four weeks of basic training.<sup>2</sup> It should be noted further that most of the cases of acute respiratory disease which occurred among the vaccinated persons were not caused by the Adenoviruses. More recently (unpublished) it was shown that the vaccine effected a 98 per cent reduction in cases caused by Adenovirus specifically.

### REMARKS

The discovery of the Adenoviruses (RI-APC-ARD agents) has taken a good-sized bite from the "respiratory pio," and the development of the effective vaccine shows promise of eliminating acute respiratory illness caused by the Adenoviruses as an important problem in military medicine. It should be pointed out, however, that there still remains a large bulk of acute respiratory illnesses of man of unknown cause. The continued application of human cell tissue culture to this problem should lead to the elucidation of the causes and eventual control of other respiratory diseases, the causation of which is presently unknown.

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# TOXIC EFFECTS OF CHLORPROMAZINE

## Hepatitis and Agranulocytosis

WALLIS L. CRADDOCK, *Lieutenant Colonel, MC, USAF*

**I**N ADDITION to the milder side effects of chlorpromazine (Thorazine, Largactil), serious reactions may occur. Because of the hazards involved and the seriousness of the hepatitis and agranulocytosis that may result, it is essential that the present status of these events be reviewed.

## CHLORPROMAZINE JAUNDICE

Enough well-documented cases of intrahepatic cholestatic jaundice from chlorpromazine have now been recorded to establish definite conclusions regarding the association of obstructive jaundice and the drug. A summary of earlier reports (through 1955) supported by liver biopsy and liver function studies appears in table 1. These cases illustrate the varied aspects of the problem. Of course, many more reports of probable chlorpromazine-induced jaundice have been published, but most of these have not been satisfactorily studied to rule out the possibility of concurrent exposure to other hepatotoxic or icterogenic agents or conditions. Laparotomy was performed in the earlier reported cases when the relationship of the drug to the jaundice was not clearly understood. The differential diagnosis is no longer as difficult, since the characteristic histopathologic features in this type of jaundice are now established and eosinophilia is often a companion finding. The lesion resulting from chlorpromazine administration is unlike that encountered in the livers of patients developing jaundice from external biliary obstruction. Evidence of stasis of bile is invariably found in the central portions of the hepatic lobules, whereas in jaundice resulting from external biliary obstruction, plugs of bile pigment may be found in any portion of the lobule, including the periphery.<sup>1</sup>

Determination of the serum aminopherase (transaminase) activity gives an index of liver cell injury, aids in ruling out the

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From Veterans Administration Hospital, Ft. Douglas, Utah. Col. Craddock is associated with 328th General Hospital, Ft. Douglas, Utah.

prosence of viral hepatitis, and indicates impending liver failure. The fact that increased transaminase activity has been found to precede the development of jaundice resulting from chlorpromazine suggests that the transaminase test may be used as a tool to anticipate, and thereby prevent, toxic hepatitis in patients who receive this potentially hepatotoxic drug.<sup>2</sup> This test appears to reflect the degree of hepatocellular damage more closely than the flocculation tests, serum cholinesterase and alkaline phosphatase activities, and other tests of liver dysfunction.

Although many chemicals are known to produce hepatic necrosis, the changes in the liver resulting from chlorpromazine administration simulate those seen in hepatitis induced by methyltestosterone and arsphenamine, with little or no evidence of hepatic cellular damage. Unlike other toxic injuries of the liver due to infectious agents (including viral hepatitis), halogenated hydrocarbons, and arsenic, hepatic injury resulting from chlorpromazine is usually mild, with minimal cellular degeneration and necrosis of individual central cells. There appears to be primary injury of the small biliary passages which become plugged with bile ("thrombi") and surrounded by an inflammatory exudate of polymorphonuclear leukocytes, eosinophils, and lymphocytes in the portal area.

It is interesting that the jaundice may occur several weeks after withdrawal of the drug,<sup>3</sup> and icterus has lasted for seven weeks after only 50 mg of chlorpromazine was given.<sup>4</sup> In cases of obstructive jaundice in which careful questioning of a patient discloses recent intake of even small amounts of chlorpromazine, operation should be deferred until a complete investigation is made to rule out the possibility of chlorpromazine-induced icterus. When cholelithiasis and cholecystitis are recorded in the history, it would be well to avoid the use of chlorpromazine because of the possible diagnostic confusion that may ensue in the hypersensitive patient. Although the jaundice may persist for over six months after drug withdrawal,<sup>5</sup> there appears to be no residual hepatocellular damage, but further study may alter this view. Several clinicians believe that there may be a greater susceptibility to jaundice in patients with histories of liver disorders. In some cases the drug has been restarted without recurrence of the jaundice, but it is inadvisable to again give the drug. Sparine (brand of promazine) can be given if a patient has previously been sensitive to chlorpromazine, as jaundice attributable to the administration of this newer phenothiazine compound has not been seen.

Although the seat of the reaction appears to be in the portal area, experimental evidence strongly suggests that the drug produces stasis in the biliary tree due to an increase in the resistance of the choledochoduodenal sphincter,<sup>6</sup> thus depressing



TABLE 1. Summary of reports of chlorpromazine jaundice supported by liver biopsy and liver function studies (1954-1955)

Author	Case no.	Chlorpromazine		Maximum serum			Eosinophilia (per cent)	Weeks of icterus	Remarks
		Daily dosage (mg)	Duration of treatment (days)	Bilirubin (mg/100 ml)	Alkaline phosphatase (B. U.)	Cholesterol (mg/100 ml)			
Lemire & Mitchell <sup>14</sup>	1	200	23	(ser. Ind. 106)	17.3	-	7	6	Laparotomy done in all 3 cases. All had severe pruritis but no chills, fever, vomiting, or malaise.
	2	100	15	48.6	10.8	250	17	8	
	3	50	31	8.1	36.0	584	Absent	6	
Boardman <sup>15</sup>	4	Up to 500	21	23.0	25.0	-	Absent		Death. Autopsy findings supported diagnosis of "toxic hepatitis."
Zatuchni & Miller <sup>20</sup>	5	75	14	13.7	10.0	461	Absent	4	Laparotomy.
Movitt, <sup>12</sup> et al.	6	100	28	21.0	13.0	325	Absent	3	Laparotomy.
	7	50	30	26.0	32.0	610	Absent	6	Needle biopsy. Transient splenomegaly present.
	8	125	22	6.7	20.0	304	Absent	2	Needle biopsy.

TABLE 1. Summary of reports of chlorpromazine jaundice supported by liver biopsy and liver function studies (1954-1955)---Continued

Author	Case no.	Chlorpromazine		Maximum serum				Eosino- philia (per cent)	Weeks of icterus	Remarks
		Daily dosage (mg)	Duration of treatment (days)	Bili- rubin (mg/100 ml)	Alkaline phosphatase (B. U.)	Choles- terol (mg/100 ml)				
Sussman & Sumner <sup>4</sup>	9	50 (single dose)	-	14.0	9.0	-		Absent	7	Needle biopsy. Apparent acute hyper- sensitivity; 2 hours after repeat dose of 38 mg, severe systemic symptoms with recurrence of jaundice.
Van Ommeren & Brown <sup>21</sup>	10	75	21	18.8	16.6	276		42; 6 after 13 days	11	Needle biopsy; no response to ACTH therapy.
Gold, et al. <sup>9</sup>	11	75	21	10.0	24.0	539		16	3	Needle biopsy.
	12	75	14	10.3	22.0	353		5	3	Needle biopsy.
	13	75	25	*2.5	*51.0	*1768		Absent	6	*Tests not done until 3 weeks after on- set of jaundice. Needle biopsy.
Hodges & LaZerte <sup>22</sup>	14	50	28	15.95	7.7	325		4	2	Death. Liver biopsy showed chlorpromazine hepatitis. Agranulocytosis also com- plicating feature. (See table 3)

TABLE 1. Summary of reports of chlorpromazine jaundice supported by liver biopsy and liver function studies (1954-1955)—Continued

Author	Case no.	Chlorpromazine		Maximum serum				Eosinophilia (per cent)	Weeks of icterus	Remarks
		Daily dosage (mg)	Duration of treatment (days)	Bilirubin (mg/100 ml)	Alkaline phosphatase (B. U.)	Cholesterol (mg/100 ml)				
Kelsey et al.	15	400	21	4.2	14.0	-	Absent	8	Liver biopsy.	
	16	200	14	3.4	17.6	-	Absent	2	Liver biopsy.	
	17	30	12	5.0	17.8	-	Absent	7	Liver biopsy.	
	18	Not stated		7.7	13.5	-	Absent	3	Laparotomy.	
	19	40	20	11.4	9.3	269	Absent	3	Liver biopsy.	
	20	800	30	7.0	42.0	-	Absent	6	Drug discontinued 10 days before jaundice. Liver biopsy. BUN 133 mg.%, became normal at 4 weeks. Abnormal serum protein, TT and CC flocc. persisted.	
	21	40	5	11.9	19.4	-	Absent	11	Previous cholecystitis. Liver biopsy. Splenomegaly. Liver function remained abnormal (normal function day of starting chlorpromazine). BUN 45 mg.%, became normal at 2 weeks.	

TABLE 1. Summary of reports of chlorpromazine jaundice supported by liver biopsy and liver function studies (1954-1955)—Continued

Author	Case no.	Chlorpromazine		Maximum serum			Eosinophilia (per cent)	Weeks of icterus	Remarks
		Daily dosage (mg)	Duration of treatment (days)	Bilirubin (mg/100 ml)	Alkaline phosphatase (B. U.)	Cholesterol (mg/100 ml)			
McHardy, et al. <sup>22</sup>	22	40	17	6.5	19.1	-	7	3	Patient had an "allergic tendency" which may have indicated hypersensitivity. Laparotomy.
	23 24	100 150	4 5	- -	8.4 5.1	- -	Absent Absent	3 8	Liver biopsy. Onset of jaundice 1 week after drug stopped.
Stacey, et al. <sup>5</sup>	25	75	20	40.0	16.0	900 (xanthelasma)	Absent	4	Death. Rupture of liver. Liver biopsy showed ebraeteristic changes. (Patient treated for postpartum psychosis.)
Aber & Corbett <sup>23</sup>	26	100	20	15.2	20.0	330	Absent	12	History of cholelithiasis. Chlorpromazine given after cholecystectomy. Re-operated on to explore common duct—no stones. Liver biopsy at operation.

duodenal motility. That jaundice is apparently not the result of direct toxic action of chlorpromazine on the liver<sup>7</sup> is supported by the demonstrated lack of correlation between the amount of drug ingested and the occurrence of jaundice, the absence of liver damage in patients who have taken large amounts of the drug in suicidal attempts, the failure to induce liver damage in experimental animals, and the observation that in some patients jaundice is not apparent until some time after the drug is stopped.

The cause of the transient eosinophilia (as high as 42 per cent) is unknown. We have observed eosinophilia in several patients receiving chlorpromazine who did not develop jaundice, but one patient became jaundiced after eosinophilia had been present for about one week. Steroid or corticotropin (ACTH) therapy does not appear to affect the clinical course of chlorpromazine jaundice, in contrast to the prompt and striking response to intravenous ACTH therapy often demonstrated in cases of cholestasis of viral origin.<sup>8</sup> Concomitant administration of other drugs such as large doses of estrogens and Atabrine (brand of quinaerine hydrochloride) might predispose to liver damage from chlorpromazine.

Jaundice occurs in about one per cent of patients treated with chlorpromazine in mental hospitals. Usually they are not very sick, and they experience less fatigue than patients suffering from other forms of hepatitis. Nevertheless, it must be emphasized that there have been several fatal cases of hepatitis implicating the drug. The jaundice may develop insidiously or there may be an abrupt onset of mild flulike symptoms with or without fever. A program of bed rest and special diet is unnecessary. Despite the hepatitis, electroconvulsive therapy has been given during the period of jaundice without any apparent ill effects. The liver is usually slightly enlarged but nontender. Transient splenomegaly has been reported. The results of the liver function tests are similar to those obtained in patients with obstructive jaundice, with significant elevation of serum alkaline phosphatase and transaminase activity and often high values of serum total cholesterol. The alkaline phosphatase may remain high after the serum bilirubin and cholesterol return to normal. A very high cholesterol level was reported in one case (1,768 mg per 100 ml); in this instance the hyperlipemia may have been due in part to the diabetes and renal disease that complicated the hepatitis.<sup>9</sup> However, the serum cholesterol returned to normal after the jaundice disappeared. There has been no evidence of disturbed porphyrin metabolism from chlorpromazine in the cases we have studied.

Another interesting observation is the elevation of blood urea nitrogen recorded in 8 of 12 cases reported by Kelsey and associates,<sup>10</sup> the levels ranging from 20 to 130 mg per 100 ml. In one

patient known to have azotemia at the time of drug administration, the blood urea nitrogen rose from 60 to 130 mg per 100 ml in a two-week period. During this time he developed jaundice. This suggests the possibility that impaired renal excretion of the drug might play some role as a cause of hepatic injury.

Because evidence of functional hepatic impairment in patients on chlorpromazine therapy has been demonstrated by liver tests in the absence of jaundice (in 50 per cent of the cases reported by Lehman and Hanrahan<sup>11</sup>), it may be wise to carry out such laboratory procedures in all patients receiving large doses of the drug over prolonged periods.<sup>12</sup> In one study<sup>3</sup> 100 patients treated with chlorpromazine were followed by serial determinations of the alkaline phosphatase activity. The drug was discontinued when the concentration exceeded normal. In this group only one patient developed jaundice.

A review of the cases of jaundice due to chlorpromazine reported in the literature through 1955 reveals the data to be rather inadequate for excluding the possibility of concurrent exposure of the patient to other hepatotoxic or icterogenic agents and conditions. Criticism pertains particularly to the cases in which no histopathologic studies were done. Five cases of chlorpromazine jaundice have been carefully studied at our hospital. The transaminase activity in all cases followed the pattern seen in extrahepatic obstructive jaundice. The electrophoretic pattern of the serum proteins was undisturbed. In one case jaundice did not appear until three weeks after the drug was stopped; a total dose of 1.1 grams of chlorpromazine had been given in a dosage of 0.25 gram daily.

The laboratory data in one of our cases are summarized in table 2. All cases have been followed in similar manner. The histopathology report of a biopsy specimen of the liver in this case was: "Periportal area shows minimal fibrosis with lymphocytes, eosinophils, and polymorphonuclear leukocytes. There is also a mild focal necrosis of some periportal hepatic parenchymal cells. Some sections disclose inspissated bile plugging tiny canaliculi. Proliferation and distortion of small bile ducts are evident." Biopsies of liver specimens performed in the other cases showed similar findings.

An additional patient was studied at another hospital.<sup>13</sup> Jaundice began more than three weeks after stopping chlorpromazine; only 0.025 gram of the drug was given daily for six days. Serum bilirubin was 14 mg per 100 ml and alkaline phosphatase was 34 Bodansky units when laparotomy was done, although blood eosinophilia of 32 per cent suggested drug-induced icterus. No gross pathologic lesions were seen at operation, but a biopsy specimen of the liver showed the characteristic features described in chlorpromazine hepatitis.

TABLE 2. Laboratory data: Case report of chlorpromazine jaundice\*

Year 1955	12-8	12-12	12-14	12-16	12-19	12-21	12-23	12-27	12-30
Icteric index	20	85		50	25		15	10	6
Bilirubin, mg/100 ml									
1 minute	1.5	4.5	6.3	5.15	3.0		1.1	0.8	0.5
30 minutes	2.2	6.0	8.8	7.2	4.0		1.8	1.25	0.7
White blood cell count	5,100	14,600	16,900	13,600	15,500	10,500	11,000	9,600	9,200
Per cent eosinophils	12	13	10	8	10	5	2	3	2
Erythrocyte sedimentation rate	23		33	25		37			24
Cholesterol (total) mg/100 ml		330		327	337		250		
Cholesterol (esters) mg/100 ml		240		240	170		170		
Cephalin cholesterol flocculation		Neg			Neg				Neg
Thymol turbidity		0.8			0.8				0.8
Cholinesterase		75% of normal			Normal				
Alkaline phosphatase (Bodansky units)	4.2	6.3	6.7	6.7	5.5			3.1	
Serum proteins:									
Albumin (g/100 ml)		4.9		4.8	4.8				5.0
Globulin (g/100 ml)		2.2		2.2	1.9				2.4
Total (g/100 ml)		7.1		7.0	6.7				7.4
Protein electrophoresis			Normal pattern						Normal pattern

TABLE 2. Laboratory data: Case report of chlorpromazine jaundice\*—Continued

Year 1955	12-8	12-12	12-14	12-16	12-19	12-21	12-23	12-27	12-30
Transaminase activity (SGO-T) in units			150 (normal 5-40)			70		5.5% retention	20
Bromsulfalein excretion 45 min/5 mg						68.0			
Fecal urobilinogen mg/24 hr		1.0							
Urine:									
Bile (mg/24 hr)	2+	4+	3+	1+	-	-	-		
Urobilinogen (mg/24 hr)		0.02		0.06		4.0			
Porphobilinogen	neg	neg		neg		neg			
Serum amylase (control) in units			354 180		304 156		180 156		

\*Liver biopsy performed on 12-12-55.

X-ray chest (12-8-55), flat plate of abdomen (12-12-55), and cholecystogram (12-19-55): all normal.

Urinalysis remained within normal limits except for bilirubin; bct. bleeding time, prothrombin activity, electrocardiogram: all normal.

Fasting blood sugar (true), 80 mg/100 ml; blood urea nitrogen, 11 mg/100 ml (12-12-55).



## AGRANULOCYTOSIS FROM CHLORPROMAZINE

The possibility that patients treated with chlorpromazine may develop agranulocytosis is not as widely appreciated as it should be, since this serious complication occurs much more seldom than chlorpromazine jaundice. Fever, jaundice, and skin eruptions during the early weeks of treatment should be taken as danger signals and compel repeated examination of the blood, if not withdrawal of the drug.

Ulcerative stomatitis, particularly if it occurs at about the sixth week of treatment, should be an absolute indication for the immediate cessation of therapy.<sup>14</sup> One case concerns a patient in whom jaundice was followed by agranulocytosis and death.<sup>15</sup> A causative relationship in this case between the administration of chlorpromazine, subsequent jaundice, and agranulocytosis can only be assumed. The circumstantial evidence, however, is strong in view of accumulating reports. The earlier reports are summarized in table 3.

The mechanism of the production of agranulocytosis and the therapeutic approach to this disorder are discussed in a review by Rotstein, Frick, and Schiele.<sup>16</sup> It is suggested that chlorpromazine agranulocytosis occurs within eight weeks after the drug is started, and most cases to date have occurred in patients over 50 years of age. Unpublished reports of agranulocytosis attributed to use of chlorpromazine total more than 50 cases with at least 17 deaths.<sup>17</sup> At the rather alarming rate these cases are accumulating, the drug may come to rank as an offender comparable to chloramphenicol, the thiourea derivatives, several antiepileptic drugs, and many other new drugs known to cause fatal agranulocytosis.

## SUMMARY AND CONCLUSIONS

A study has been made of the better documented reports of chlorpromazine jaundice and agranulocytosis. The important features of these complications have been reviewed.

Chlorpromazine-induced jaundice is of the intrahepatic cholestatic type, and there is usually no associated hepatocellular damage. Nevertheless, several deaths from chlorpromazine hepatitis have been reported. Since the clinicopathologic syndrome of primary intrahepatic cholestasis may have diverse causes, the jaundice may offer considerable difficulty in differential diagnosis. Jaundice may occur several weeks after discontinuing the drug, and it may persist for many months, irrespective of the amount of drug given. In cases of obstructive jaundice in which careful questioning of the patient discloses recent intake of even small amounts of chlorpromazine, operation should be deferred until a complete investigation is made to rule out the possibility of drug toxicity. The transaminase test is valuable in excluding

TABLE 3. *Agranulocytosis associated with chlorpromazine administration (1954-1955)*

Author	Case no.	Chlorpromazine			Lowest white blood cell count	Differential (per cent)	Bone marrow examination	Remarks
		Daily dosage (mg)	Total dosage (grams)	Duration of treatment (days)				
Boleman <sup>24</sup>	1	280	6.0	60	500	100 leukocytes	Aplastic marrow	Death 2 days after onset of diarrhea, fever to 105°F, increasing pulmonary edema. (Small doses of phenobarbital had also been given. A few cases of agranulocytosis from phenobarbital have been reported.)
Hodges & LaZene <sup>18</sup>	2	50	1.4	28	4,000	99 leukocytes 1 monocytes	Hypocellular	Death. Exploratory laparotomy one week prior to death because of possible "surgical" jaundice. Biliary tract and adjacent organs normal. Liver biopsy characteristic of chlorpromazine hepatitis. ACTH given after onset of jaundice and prior to agranulocytosis without benefit.
Lomas <sup>25</sup>	3	250-300	6.0	21	680	89 leukocytes 11 neutrophils	Not done	Recovery after 5 days. Cortisone used in addition to antibiotics.
Munch-Petersen <sup>26</sup>	4	200-250	10.8	48	800	86 leukocytes 14 neutrophils	Not done	Recovery after 9 days.

TABLE 3. *Agranulocytosis associated with chlorpromazine administration (1954-1955)*—(continued)

Author	Case no.	Chlorpromazine			Lowest white blood cell count	Differential (per cent)	Bone marrow examination	Remarks
		Daily dosage (mg.)	Total dosage (grams)	Duration of treatment (days)				
Glacinski & Lauenius <sup>23</sup>	5		Not stated		200	78 leukocytes 22 neutrophils	Not done	Recovery after 40 days.
Talbot <sup>14</sup>	6	75-150	5.5	41	200	95 leukocytes 5 neutrophils	Not done	Death. Clearcut clinical evidence of chlorpromazine sensitivity (erythema and rash) preceded agranulocytosis by 2½ weeks. No autopsy.
Prokopowicz <sup>24</sup>	7	100-150	5.8	50	1,500	79 leukocytes 20 monocytes 4 myelocytes 6 neutrophils	Not done	Death in 36 hours after onset of agranulocytosis. No autopsy.
Itotstein, Prick, & Schiele <sup>14</sup>	8	75-100	4.0	50	350	100 lymphocytes	Hypocellular with virtual absence of granulocytes	Complete recovery with normal bone marrow 19 days after onset of symptoms. Fall in hemoglobin from 16.0 to 10.8 g/100 ml within 6 weeks after drug started.

the possibility of concurrent exposure of patients to other hepatotoxic or icterogenic agents or conditions. Increased transaminase activity has been found to precede the development of jaundice from chlorpromazine.

During the first two months of therapy it is recommended that a urinalysis be done for bile twice a week, and that frequent white cell counts be made during this period and whenever else indicated, especially when fever, sore throat, or skin eruption suggests the presence of sensitivity to the drug. If the blood serum appears icteric, serum bilirubin, alkaline phosphatase activity, and other liver function studies are indicated, as in all cases of toxic reactions should be carefully studied. However, no laboratory data can be substituted for careful, continued, clinical observation of the patient.

It would seem wise to avoid chlorpromazine therapy when infectious hepatitis is endemic, in the presence of liver disease, in malnourished patients, and when other potentially hepatotoxic agents have been used. Sparine (brand of promazine) can be safely given if a patient has previously been sensitive to chlorpromazine.

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## RESENTMENT TO ANTIBIOTICS

To those of us who, like Ambrose Pare, believe in the fundamental normalcy of the healing processes in man when tissues are tenderly handled and left so far as possible in their natural state, there is neither need nor justification for the surgeon routinely to divide the responsibility for an intestinal anastomosis between his surgical skill and the antibiotics. We may even wonder if the reaction, mild or fatal, which occasionally follows the use of these agents may not suggest resentment on the part of the body to their interference with a function which it is so well devised to carry out.

—LELAND S. MCKITTRICK, M. D.  
in *Surgery, Gynecology and Obstetrics*  
p. 375, Sept. 1954

# PSYCHOLOGICAL COMPARISON OF AUTOMOBILE DRIVERS

Accident- and Violation-Free Versus  
Accident-Violation-Incurring Drivers

FREDERICK L. MCGUIRE, *Lieutenant, MSC, USN*

**T**HE PROBLEM of highway safety, because of the thousands of lives and billions of dollars expended each year in automobile accidents, is one of our foremost social problems. Adequate descriptions of this carnage and waste appear elsewhere.<sup>1-3</sup>

The concept of unequal liability<sup>4</sup> (often referred to as accident proneness) prompted a widespread search for factors which make one person more liable to accidents than another. Most of the earlier studies were concerned with psychophysics, investigating such factors as vision, hearing, reaction time, and co-ordination. More recent research, dealing primarily with sociologic and personality factors as possible correlates of accident frequency,<sup>5-7</sup> has made it apparent that psychophysical measurements of human performance are not adequate for accident prediction even though there are instances in which a statistical significance can be demonstrated.<sup>8</sup>

Previous investigations of personality and biographical factors as related to automobile accidents have likewise produced little evidence that is conclusive in itself, because they were not always carefully controlled. The findings were of enough significance, however, to indicate that this approach to the problem might be fruitful.<sup>9-11</sup> In nearly all of this work a basic difficulty in methods was encountered. Analyzing the many personal and situational factors that must take place in exact sequence for an accident to occur becomes an extremely complex problem. The statistical manipulation of these variables would be an impossible task, since many of them are intangible and cannot be measured adequately.

The hypothesis of accident proneness assumes that a significant number of people have qualities in common that predispose

them to accidents, and further assumes that these qualities are relatively stable and amenable to measurement. The limited success met by the use of objective-type measuring technics indicates, however, that accident-producing qualities either do not possess these two attributes, or that the technics employed have not been adequate. It would appear, therefore, that if we are to achieve success in differentiating automobile drivers, a new approach must be sought.

The emphasis in the study here reported falls upon the accident- and violation-free group in an attempt to outline personality traits uniformly present in accident-free individuals. There are four reasons why it is logical to study the safe driver rather than the accident repeater: (1) It is the safe driver we wish to select for taxis, buses, trucks, and other vehicles. (2) The accident repeater contributes not more than three to four per cent to the accident problem.<sup>10</sup> (3) The safe driver is more easily defined operationally. (4) Many unsafe drivers do not fall in the accident-repeater classification. The experimental design of this study is based on the assumption that the accident- and violation-free driver belongs to a homogeneous group. That is, prolonged safe driving can be produced only by adhering to a common set of rules and regulations of conduct and therefore must be produced by drivers with similar attitudes and behavior patterns. On the other hand, a person may be accident-prone for as many reasons as there are patterns of maladjustment, and a particular member of the group need not bear any similarity to any other member except in terms of his accident record.

### METHOD

Two groups of 67 subjects each, selected and carefully matched by methods previously described,<sup>11</sup> were compared in this study. One group was chosen from Camp Lejeune accident records and consisted of men each of whom had had at least one accident within recent months in which he had also violated a moving traffic regulation. The other group comprised persons whose answers to a questionnaire indicated that they had neither been involved in an accident nor been cited for a traffic violation of any type throughout their driving careers, and who in other ways matched the accident group.

Every subject in each group, as reported in detail previously,<sup>11</sup> received extensive psychometric testing plus a personal interview. From the results of the various tests given, the scores selected for analysis of differences between the two groups were those of the Minnesota Multiphasic Personality Inventory (MMPI), the Bell Adjustment Inventory (Bell), the Kuder Preference Record-Personal (Kuder), and the Rosenzweig Picture Frustration Study (Rosenzweig). These tests, plus the miscellaneous attitude

items, were subjected to item analysis, and the items that differentiated between the two groups by at least a 5 per cent level of confidence were examined for personality, sociologic, and attitude characteristics that would identify the accident- and violation-free driver. Items found to have no particular ability to describe traits of either group were not used in the interpretation.

### RESULTS AND DISCUSSION

Table 1 lists those scales of the standardized tests that produced significant differences between the two groups. It is noted that two scales of the MMPI—the Psychopathic Deviate (PD) and the Schizophrenic (Se)—were significant.<sup>12</sup> This does not mean that the accident group is psychopathic or schizophrenic simply because its score is significantly higher than that of the accident-free group; actually, the scores of both groups lie well within the normal range. It does lend support, however, to the hypothesis that personality tests of this type are capable of differentiating between accident-incurring and accident-free populations.

TABLE 1. *Results of test scales that differentiated between groups*

Test scale	Accident-free group		Accident group		Critical ratio
	Mean	S. O. *	Mean	S. D. *	
Minnesota Multiphasic Personality Inventory					
Psychopathic deviate	15.7610	03.9161	19.4630	04.4800	5.0539
Schizophrenic	08.7460	06.4440	12.0300	08.9363	2.4215
Rosenzweig Picture Frustration Study					
Ego-defensive	59.3000	11.1530	53.3000	10.1700	3.2290
Need-persistence	24.9000	10.3200	30.7000	09.4500	3.3680

\*Standard deviation

The Rosenzweig showed significant differences on the Ego-Defensive (E-D) and Need-Persistence (N-P) scales.<sup>14</sup> As with the MMPI scales, the evidence is not sufficient to allow more than speculation as to the meaning of these differences. This is especially true because the Rosenzweig is still in the process of being validated.<sup>15</sup> If one examines the various possible types of response under these two scales, it becomes evident that it is not possible to conclude much about the mode of reaction to frustration for either group, or to infer personality dynamics. It was possible to obtain separate scores based on an item analysis of the Rosenzweig. When the two groups were scored on the basis of these items the scores produced a biserial correlation of 0.53 with the criteria. The results of this work were reported previously.<sup>11</sup>



Item analysis disclosed that about 85 items from the Bell, MMPI, Kuder, and the collection of miscellaneous attitude items were significant to at least the 5 per cent level of confidence (c. r. of 1.96 or more). An examination of these items produced definite and consistent psychological patterns. Thus it became possible to describe some of the traits that tend to be associated with accident- and violation-free behavior on the highway.

When compared with the accident-violation driver, the accident- and violation-free driver shows the characteristics listed in the following tabulation. The figures in parenthesis after each item refer to corresponding items in the Safe Driver Inventory Test.<sup>11</sup>

1. *Is more conservative and moderate in his attitudes*

- a. Less attracted to the use of alcohol. (21, 83)
- b. Less attracted to taverns and liquor parties. (79, 80)
- c. Does not like to see women smoke. (29)
- d. Goes to church more often and is more attached to the church. (9, 81, 82)
- e. Prays more often. (33)
- f. Does not as readily agree that war is necessary under any conditions. (72, 73)
- g. Is more careful whom he trusts. (23, 24).
- h. Does not feel he has to bet on a race or game in order to enjoy it. (14)
- i. Is more concerned over his health. (2)
- j. Is less in favor of socialism. (86)

2. *Is socially more efficient*

- a. Has a greater liking for working with people. (55C, 57B)
- b. Has less difficulty dealing with groups. (70, 56B)
- c. Finds it easier to find interesting things to do. (1)
- d. Has a kinder attitude toward people. (61A)

3. *Is socially more stable*

- a. Doesn't feel like picking fights as often. (8, 10)
- b. Doesn't lose his temper as easily. (22)
- c. Is not as easily upset or apt to take every little thing to heart. (28)
- d. Is happier with his job. (66)

4. *Has more mature outlook*

- a. Isn't as quick to blame others for his troubles. (12, 15)
- b. Isn't as prone to cry over spilt milk. (67)
- c. Has fewer misgivings about the past. (5)

5. *Has different tastes and interests*

- a. Has greater liking for:
  - (1) Poetry. (5, 42B)

- (2) Growing plants and collecting flowers. (16)
  - (3) Reading history. (35)
  - (4) Attending lectures on serious subjects. (30)
  - b. Has less liking for:
    - (1) Attending exclusive night clubs. (54A)
    - (2) Dog and horse races. (42C, 85)
    - (3) Being an auto race driver. (31)
  - c. Has greater interest in education and science. (84, 88)
6. *Is more conscientious and ambitious*
- a. More willing to accept responsibility. (40C, 51A)
  - b. Can make decisions more easily. (18)
  - c. Has a higher aspiration level. (45C, 51C)
  - d. Sets higher workmanship standards for himself. (34)
  - e. Is not as easily influenced by other people. (8)
  - f. Is more concerned with his personal independence. (68)
7. *Had happier childhood*
- a. Had fewer arguments with his family. (10)
  - b. Had fewer impulses to run away from home. (27, 71)
  - c. Was happier and more productive in school. (3, 20, 26)
8. *Has healthier attitude toward law*
- a. Is more ready to believe law helps the common man. (77)
  - b. Has had less trouble with the law. (25)
  - c. Is more concerned with staying out of trouble with the law. (19)
9. *Has healthier attitude toward operating a vehicle on the highway*
- a. Doesn't believe accidents are mostly due to luck. (76, 78)
  - b. Believes a good driver must always pay close attention to his driving. (75)
  - c. Is more willing to share highway with trailer trucks and other vehicles. (74)

In addition to using the statistical method in choosing the significant items, two other criteria can be employed in order to test their validity. The first is to note whether or not there is any contradiction between test items. For example, there were several items concerning the school history and home life of the testee. If these items were chosen by chance only, it is likely that at one point the accident group would have indicated a happier school or home life, but in response to a similar item might have indicated the opposite. One of the two groups might have reported that they prayed more often, yet have indicated a less frequent church attendance; or they might have indicated a greater liking for liquor parties, yet have shown that they used alcohol to a lesser extent than the other group. The list of items chosen do not contain any such contradictions.

The second test is one of chance. Using the 5 per cent level of confidence as a criterion, it can be said that by chance

alone 5 out of every 100 test items would be chosen as being statistically significant. This presupposes that every item has as much chance of being selected as every other. Because of the heterogeneous nature of the different test items in the original pool and their uneven distribution, this prerequisite cannot be fulfilled. Therefore, if more than the expected number of items were selected as being significant it is a point in favor of the validity of the chosen items; however, if the number of items chosen was less than expected the evidence is not negative.

In general, the chosen items meet the second test, but I do not rely on it as an adequate test and am more inclined to accept the test of intra-item consistency. When these items were placed in test form and submitted to cross-validation groups similar to those used in this study, the results supported their validity.<sup>12</sup> Work done by other investigators also tends to support the conclusions drawn from them.

The characteristics of the accident-violation-free driver, as they have been outlined here, tend to lend themselves very well to that kind of driving behavior that is generally thought to be necessary for accident-free operation. In other words, the results are what one would expect. For example, we would certainly expect the safe driver to have a healthier attitude toward law. The fact that he is a more responsible person and is more conservative in his use of alcohol also logically fits the picture of a safer driver. The fact that he is more intellectually inclined and more at home with ideas equips him better to understand that traffic signs and laws are the attempt of society to protect itself—to understand that group living requires certain responsible behavior.

Because driving upon the highway is essentially an interpersonal situation, we would expect that the person who gets along best on the highway also gets along best with people. It is fitting that our accident- and violation-free driving group should bear the earmarks of better adjustment—a smoother home life and more ease in his relations with people.

Tillman's work agrees with what has been found in this study. Due to differences in the techniques used, certain characteristics of the groups are emphasized more in this study than in Tillman's, and there are differences in the kinds of characteristics listed, but in no instance do Tillman's data contradict any of our findings. His high-accident population of taxi drivers is more extreme in their "undesirable" qualities; they seem to be borderline psychopathic deviates. This may be due to the type of population he used for the study and not be a true description of all high-accident drivers.

Tillman's data were gathered by interview techniques. He spent three months in informal fashion with the drivers, riding in their

cabs and talking to them between fires. In spite of possible sources of bias (Tillman apparently knew in advance which drivers were in the high-accident and low-accident groups), the method used has the advantage of being able to handle and evaluate many variables at once and is limited only by the skill of the investigator. Unskilled or semiskilled persons cannot apply the technique, and the results do not permit objective analysis. The questionnaire method, as used in this study, is able to circumvent these two objections. Both methods have definite worth, and it is important to note that they yield similar results.

Work by Dunbar<sup>14-18</sup> with hospital fracture cases, utilizing interview, biographic, and Rorschach data, arrived at conclusions compatible with the results of this study and of Tillman's. A preliminary report of work now being done at the University of Colorado<sup>19</sup> indicates that its sample of drivers possess personality characteristics consistent with those reported herein.

### SUMMARY AND CONCLUSIONS

Two groups of automobile drivers, each consisting of 67 subjects, were tested and interviewed. One group comprised drivers who in all their driving history had never incurred a motor vehicle violation or been involved in an automobile accident of any kind. The other group was composed of drivers who recently had been involved in at least one accident in which they had incurred a moving violation.

An item analysis of the test items (excluding the Rosenzweig and the sentence-completion test) provided a method of describing certain personality, sociologic, and attitudinal differences between the two groups. It was determined that the accident- and violation-free driver is more mature, conservative, and intellectual in his interests and tastes, has a higher aspiration level, and is the product of a happier family background than is the accident-violation-incurring driver.

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## RESEARCH AND THE PUBLIC

"Over the next decade, the public image of science, of medical research, and of the scientist may become more realistic. Research is more widely publicized through newspapers, magazines, radio, and television than at any time in the past. The public's avidity, spontaneous or artificially stimulated, for information on research is remarkable. The emergence of scientific writing for popular consumption as a clear professional journalistic specialty is a most encouraging development for the future. The development of a mature attitude by scientists toward their responsibilities and their rights in communicating to the public is another encouraging factor."

—JAMES A. SHANNON, M. D.  
in *Journal of the American Medical Association*, p. 1030, Mar. 24, 1956

# A STATISTICAL STUDY OF ALVEOLAR OSTEITIS

SAM R. ADKISSON, *Captain, USAF (DC)*

PERRY F. HARRIS, *Captain, USAF (DC)*

**A**LVEOLAR osteitis has consistently been the most unpleasant and the most frequent single complication following the extraction of teeth. A specific definition for alveolar osteitis (or "dry socket," as it is more commonly known) is lacking in the literature. The clinical entity most commonly diagnosed as alveolar osteitis is generally characterized by one or more of the following conditions: (1) pain, (2) loss of a normal blood clot in the socket, (3) denuded bone surfaces and necrotic material in the socket, (4) delayed healing, and (5) foul odor. A number of causative factors has been suggested and a variety of treatments used. It may be concluded that the cause or causes and mechanism of alveolar osteitis are not yet fully understood. This particular study has been undertaken in order to determine any relevant statistical patterns related to alveolar osteitis as observed among personnel of the U. S. Air Force.

## MATERIAL AND METHODS

All data for this study were collected from AF Form 309, Dental Health Record, of U. S. Air Force personnel on active duty. A series of 5,500 consecutive clinical records was screened for recorded cases of alveolar osteitis. No distinction was made as to grade or rank of the patient in the collection of data.

In the series of 5,500 clinical records surveyed, there were found 116 (2.10 per cent) patients in whom alveolar osteitis had been diagnosed and treated. The distribution of cases by age of the patient is not considered significant, as the incidence seemed to be well spread over the age group of men in active military service who required extractions (table 1).

Considerable seasonal variation in the occurrence of alveolar osteitis was observed (fig. 1). The peak of occurrence was reached in March, following a rise through January and February. The month with fewest cases treated is June. Approximately 43 per

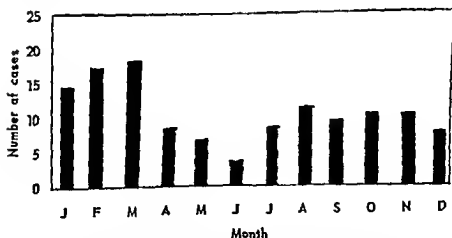
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From U. S. Air Force Hospital, Brookley Air Force Base, Ala. Capt. Adkisson is now assigned to U. S. Air Force Hospital, Olmsted Air Force Base, Middletown, Pa.

TABLE 1. *Distribution of cases by age of patient*

Age	No. of cases	Age	No. of cases	Age	No. of cases	Age	No. of cases
19	9	28	6	37	1	46	0
20	7	29	6	38	0	47	0
21	4	30	7	39	1	48	0
22	9	31	4	40	2	49	0
23	13	32	3	41	1	50	0
24	7	33	2	42	2	51	1
25	4	34	2	43	1	52	0
26	7	35	3	44	0	53	0
27	5	36	8	45	0	54	1

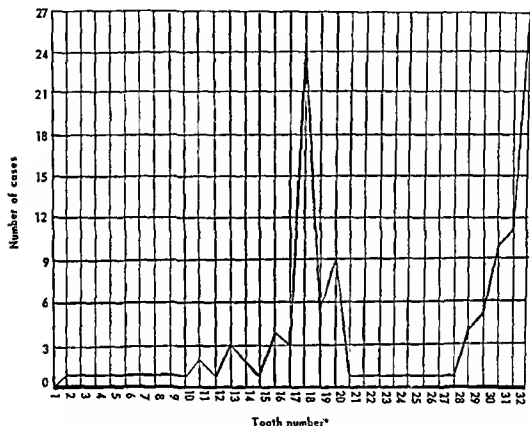
cent of all cases occurred in the three months' period of January through March. This is usually considered to be the season in which general body resistance is at a low level and upper respiratory infections are active. That the incidence of cases occurring in December is lower is probably due to the fact that many servicemen are on leave and fewer teeth are extracted during this period.

Figure 1. *Distribution of cases by month of occurrence.*

No cases in conjunction with pericoronal infections in the upper arch were found in this study. All cases of pericoronal

infection studied were associated with lower third molars. Of the total of 51 such cases, 34 (66.7 per cent) were associated with previous pericoronal infection. This fact points up the importance of carefully controlling pericoronal infections before extracting lower third molars.

There is a marked predilection for alveolar osteitis as the tooth location becomes more posterior. The peaks of incidence are in the lower third molar areas (44.0 per cent) with lower molar and bicuspid areas next in order (fig. 2).



\*The teeth are numbered 1 through 32, with No. 1 being the upper right third molar; No. 16 being the upper left third molar; No. 17 being the lower left third molar; and No. 32 being the lower right third molar.

Figure 2. Distribution of cases by location of tooth involved.

The removal of lower teeth much more often results in alveolar osteitis. About 84 out of every 100 cases are in the lower arch (table 2). The variation in occurrence between right and left sides is not considered significant.

Alveolar osteitis more often follows a single extraction than a multiple extraction. Of all cases studied, 80.2 per cent were associated with a single extraction. Surgical removal was performed in 34.5 per cent of all extractions, and in 58.8 per cent of extractions in lower third molars. Trauma, therefore, may not



be as important in causing alveolar osteitis as hitherto believed. Sutures were used for closure in 44.8 per cent of the cases studied. The variation between these cases and those in which sutures were not used is not considered significant.

TABLE 2. *Distribution of various findings in 116 patients with alveolar osteitis*

Findings and occurrence		Number of cases
Location	Arch	
	Upper	19
	Lower	97
	Side of arch	
	Right	63
	Left	53
Extractions	Number	
	Single	93
	Multiple	23
	Type, lower third molars	
	Simple (uncomplicated)	21
	Surgical	30
	Type, all cases	
	Simple (uncomplicated)	76
	Surgical	40
Treatment	Sutures	
	Used	52
	Not used	64
	Hypnotics or sedatives	
	Used	20
	Not used	96
	Antibiotics	
	Used	22
	Not used	94
History	Previous lesions	
	Yes	38
	No	78

### POSTOPERATIVE PERIOD

The period of time elapsing between extraction and the institution of treatment for alveolar osteitis varied with the individual case (fig. 3). The number of patients returning for treatment rose from the first postoperative day to a peak on the fourth postoperative day. In 70.7 per cent of all cases, treatment was begun by the end of the fourth postoperative day. By the end of the first postoperative week, 95.7 per cent of all patients had returned for treatment.

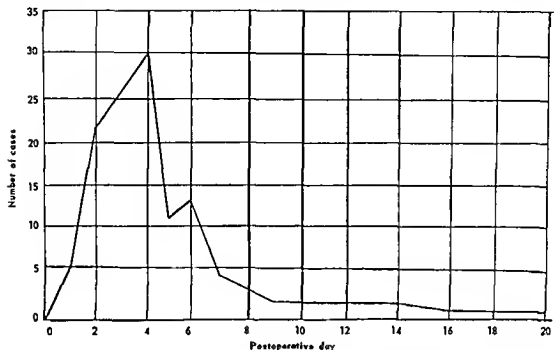


Figure 3. Distribution of cases by postoperative day on which treatment was begun.

The number of days' treatment required varied with the individual case (fig. 4). The peak number of cases was completed by the end of five days of treatment. By the end of one week of treatment 60.3 per cent of all cases were completed. By the end of two weeks of treatment, 87.1 per cent of all cases were discharged without further treatment. A few resistant cases required treatment for from three to four weeks.

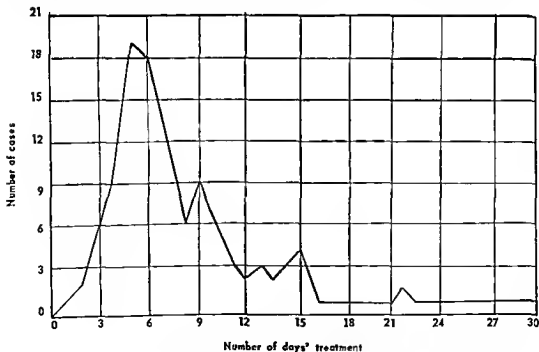


Figure 4. Distribution of cases by the number of days' treatment required.

The prescription of sedatives or hypnotics to control pain and/or induce sleep varied with the needs of the individual patient. Of the cases herein reported, 82.7 per cent required no medication other than the local treatment of the affected socket (table 2). There seems to be no uniformity of opinion among dentists as to the efficacy of systematically administered antibiotics in the treatment of alveolar osteitis. Of the patients studied only 19.0 per cent were given antibiotics as a part of treatment. The sample reflected in this survey on this point is not sufficiently great to justify any conclusions. About 33 per cent of the patients considered in this study had previously been treated for alveolar osteitis. This seems to indicate that certain patients have a greater tendency to develop an alveolar osteitis than do others.

Although the interrelation of the various dental diseases is not well understood, there appears to be a direct correlation between the incidence of alveolar osteitis and other forms of dental disease, with osteitis tending to occur in mouths where other diseases are active. The 116 subjects of this study who had alveolar osteitis also had, on the average, 2.3 decayed, 6.0 missing, and 7.7 filled teeth.

### CONCLUSIONS

A statistical study of alveolar osteitis has been presented in which the incidence of this postoperative complication has been correlated with reference to a series of some 15 variables. It may be concluded that alveolar osteitis does follow certain patterns within limits as described. The whole subject of alveolar osteitis is deserving of further study in order that our methods of prevention and treatment be improved.

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### CARCINOMA OF THE BREAST

More than 16,000 women die annually of carcinoma of the breast in the United States, and its incidence is increasing at the rate of one percent. However, the present outlook is not so discouraging when it is realized that 10,000 of the deaths could be prevented if the disease were treated in the early stages. The education of women to a correct method of examination every month and emphasizing the necessity of reporting to their physicians every six-months, or at any time a suspicious lesion occurs, is a big step forward.

—RALPH A. MCGILL, M. D.  
in *Journal of the International College  
of Surgeons*, p. 42, Jan. 1954

# THE QUANTITATIVE INTERPRETATION OF BALLISTOCARDIOGRAMS

## *A New Approach*

DONALD C. FISCHER, *Captain, USAF (MC)*  
CARLTON L. SHMOCK, *Jr., Captain, USAF (MC)*

**B**ALLISTOCARDIOGRAPHIC interpretation continues to suffer from the lack of a truly objective basis for analysis. As the subjective element infiltrates the evaluation, there is considerable variation in the final grading of any tracing. The frequency with which disagreements in interpretation arose in our clinic prompted the development of a grading system whereby a relative number of points are assigned to each abnormal constituent of the complexes. This point system of evaluation greatly reduced the subjective error which produced most of our discrepancies.

## MATERIAL AND METHODS

The machine used in this clinic is a direct photoelectric ballistocardiograph employing an electrical filter to eliminate respiratory swing, recording through a photographic electrocardiograph equipped with an R wave injector.

Two hundred tracings from men found physically acceptable for military service were used to determine normal values for the length of the I-J segments. The lengths of I-J in inspiration and expiration were determined separately.

Our determined mean for I-J in inspiration was 10.1. The median was 9.5. Standard deviation determined from the sine curve plotted was  $\pm 2.75$ .

Similar measurements for I-J in expiration gave a mean of 7.5, a median of 7.0, and a standard deviation equal to  $\pm 2.1$ .

The importance of these determinations is discussed below.

## METHOD OF GRADING

We consider the following in evaluating a ballistocardiogram:

1. Time of onset of H wave after R wave

2. Time of occurrence of J peak after R wave
3. Respiratory variation in the lengths of I-J segment
4. Lengths of I-J in inspiration and expiration
5. Height and configuration of H wave
6. Depth and configuration of I wave
7. Configuration of J wave
8. Depth and configuration of K and M waves
9. Height of L and N waves

Normal variations of each of these factors were determined by our own experience and the reported findings of others. As suggested by Starr,<sup>1</sup> it was necessary to determine the limits of normal for length of I-J segments for our own particular type of machine (see above).

The following are considered abnormal for each component:

1. Onset of H wave more than 0.04 second after the R wave
2. Peak of the J wave less than 0.20 second or more than 0.26 second after the R wave
3. A variation of more than 50 per cent between the tallest and shortest I-J segment
4. An I-J in inspiration less than 7.5 mm in length or an I-J in expiration of less than 5.5 (for males)\*

Points assigned each abnormality are relative to the importance of that portion of the cardiac cycle which the component represents. Points are assessed against a single component only once, regardless of the number of complexes in which it is abnormal (*e. g.*, 1 point is assessed if H is abnormal in all complexes or only in expiration).

1. Abnormal H timing	1 point
2. Abnormal J timing	1 point
3. Abnormal respiratory variation	2 points
4. Small I-J in inspiration	4 points
Small I-J in expiration	2 points
5. Abnormal H waves present	1 point
6. Abnormal I waves present	1 point
7. Abnormal J waves present	1 point
8. Abnormal K or M waves present	1 point each
9. Abnormal L or N waves present	1 point each

The final grade assigned any tracing is determined by the addition of the points assessed, thus:

Normal	not more than 1 point
Grade I	2, 3, or 4 points
Grade II	5 or 6 points
Grade III	7 or more points

\*The exact range of normal for I-J segments of females is presently being determined.

Grade IV      tracing so bizarre that  
waves cannot be identified  
for measurement

### DISCUSSION

The grading of ballistocardiographic tracings by this method was compared with those involving the determination of the percentage of abnormal complexes. Four hundred tracings were originally graded by the method of Brown, Hoffman, and de Lalla,<sup>2</sup> prior to the adoption of the point system in our clinic. These were then re-evaluated according to the point system.

In 78 per cent of the tracings which were cross-graded, there was no change in the assigned grade. As was expected, *no* tracing which was *seriously* deranged improved in grade by any method of evaluation. For example, no Grade IV tracings were upgraded, and only rarely was a Grade III considered to be Grade II.

Of the records, 16.8 per cent were given an improved grade by the point system. The tracings in this group created the most arbitrariness in our clinic. They consisted primarily of tracings given a poorer grade by percentage determination of normal. For instance, an I to J ratio less than 1:2 or a tall H wave made it necessary to consider many otherwise normal complexes as being abnormal. Usually these tracings were taken from persons in excellent physical condition as determined by history, physical examination, and laboratory aids. We, therefore, felt justified in assuming that the point system had allowed us to classify these tracings more correctly.

Some 5.2 per cent of the tracings were given a lower grade by our method than had been determined by other methods. These were mainly recorded on males over the age of 40 years. The difference in evaluation resulted from the fact that although the tracing had a regularly recurring pattern and an I to J ratio of 1:2, suggesting a grade of normal, the I-J segments were abnormal according to our standards for I-J segment length. This is a common finding in tracings from persons beyond the fourth decade of life. However, the fact that it is common does not justify a classification of normal for this age. We are in agreement with Dock, Mandelbaum, and Mandelbaum<sup>3</sup> when they state, "Abnormal patterns in the electrocardiogram or in the ballistocardiogram result from abnormal states of the circulatory apparatus, whether the individual is young or old."

The short I-J segments in all age groups primarily suggest degeneration of the myocardial thrust and a compromise in the efficiency of the heart as a pump. We feel, therefore, that this type tracing was not normal and should have been graded 3.0.

## SUMMARY AND CONCLUSIONS

In our clinic frequent disagreements arose in interpreting ballistocardiographic tracings using the percentage of abnormal complexes as a criterion for grading. We therefore devised a point system of grading to help eliminate the subjective element. The point system is discussed, including our standards for I-J segment length in inspiration and expiration.

Four hundred tracings originally graded by the method of Brown, Hoffman, and de Lalla were re-evaluated by the point system. In 78 per cent of the tracings the grade was not changed, in 16.8 per cent the grade was improved, and in 5.2 per cent the tracing was downgraded. The reason that a change in grade by the point system seemed warranted is discussed.

The point system of grading which we have presented has been a substantial aid in developing better quantitative interpretations of ballistocardiograms in this clinic. It has been outlined here in the hope that it may benefit others who have had similar difficulties.

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 MISINTERPRETATION

Misinterpretation of what the doctor says is so easy for the patient. Many a doctor who has given an explanation on which he prides himself would be disconcerted to learn the retailed version of his carefully chosen words. That is why lucidity is so essential. It is a difficult art to cut one's explanatory coat according to the intellectual cloth provided by the patient, and it must be especially hard for psychiatrists to word their interpretations without ambiguity, because the mind is even harder to explain than the body.

—RICHARD ASHER, M. D.  
in *Lancet*, p. 759, Apr. 9, 1955

# CLINICAL RECOGNITION OF EARLY AND INSIDIOUS SCHIZOPHRENIA

JOHN W. BURKETT, *Lieutenant Colonel, MC, USA*

**E**ARLY or insidious schizophrenia is not always obvious, even to the experienced psychiatrist, because it may simulate any psychiatric disorder and many organic illnesses.<sup>1,2</sup> The resultant need to stress certain clinical features of schizophrenia became apparent to me through teaching psychiatry to general medical officers at this school and supervising the work of psychiatrists of limited clinical experience.

Although generally slighted in standard textbooks of psychiatry,<sup>3-5</sup> the clinical features discussed in this article have been found to be of special value in detecting early and insidious schizophrenia, as distinguished from "pseudoneurotic schizophrenia," first described by Hech and Pelatin.<sup>6</sup> Although those features may be noted in some patients with chronic or full-blown forms, such patients are adjusting at a definite psychotic level and present little difficulty in diagnosis.

The proper management and treatment of schizophrenic patients depend on prompt diagnosis. As a rule these patients first come to the attention of general medical officers or specialists other than psychiatrists. Unless the diagnosis is suspected, the wide variety of symptoms that these patients present is extremely confusing. They are often misdiagnosed as having organic illnesses, psychoneuroses, or character disorders ("psychopathic personalities"), or are simply dismissed as malingerers.

## ANXIETY

One of the most significant and least often recognized indications of schizophrenia is the presence of intense and prolonged anxiety. Both the subjective and objective aspects of anxiety are usually thought to be associated with the psychoneuroses. To many medical officers, complaints of "nervousness" or clinical signs of anxiety automatically signify that the patient is a "neurotic." Actually the neuroses, by their very nature, are defenses against anxiety, and severe anxiety is seldom present in the neuroses for a period of more than a few hours or days. On the other hand, it is often present in early or insidious schizo-

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From Army Medical Service School, Brooke Army Medical Center, Fort Sam Houston, Tex. Dr. Burkett is now at Veterans Administration Hospital, Sepulveda, Calif.



phrenia. The schizophrenic patient will demonstrate objective evidence of such anxiety: striking tremulousness, widely dilated pupils, flushing, and severe hyperhidrosis. Occasionally widely dilated pupils will be the first clue that a psychotic and not a neurotic condition is present.

Mild or chronic signs and symptoms of anxiety, however, are frequently present in the psychoneuroses, in which anxiety differs qualitatively as well as quantitatively from that in the psychoses. The psychoneurotic patient describes his anxiety as an unknown dread or an incomprehensible but definitely uncomfortable feeling. He is unable to explain why he has such unpleasant sensations and he tells of his resultant feelings of helplessness and exasperation. He will stress that his feelings are "silly" and defy logical explanation, and will seldom speak of his feeling of apprehension as one of "fear."

The schizophrenic on the other hand will describe his anxiety in terms of fear. He will complain of fear of dying, fear that the world is coming to an end, or fear of losing control and killing someone. The total clinical picture will, of course, necessitate consideration in order to arrive at a correct diagnosis.

Although the psychoneurotic himself is unaware of the cause of his anxiety, a detailed description of his present illness and past history will suggest probable dynamic mechanisms and defense patterns. This is illustrated by the case of a very capable but somewhat overly conscientious sergeant who developed a mild anxiety state for several days after having become a warrant officer. From his history it was learned that he had long-standing dependency needs and conflicts concerning responsibility. These were incompatible with his assumption of a position of greater responsibility. The connection between his anxiety and acceptance of a warrant was quite clear, but the patient himself was not aware of the relationship. Contrary to this, the schizophrenic's anxiety will bear little relation to his current life situation. He merely recites his symptoms over and over and no psychodynamic mechanisms are suggested. The somatic components of his anxiety will often be described in a bizarre and inexact manner. In addition, he usually relates many intense feelings, such as great hatred for some member of his immediate family or a multitude of deviant sexual impulses. These are related with little hesitation and accompanied by emotional blandness.

Thus the presence of intense and prolonged anxiety, which shows little relation to current life problems and is described as a specific fear, should alert the physician to the possible presence of schizophrenia.

#### HYPOCHONDRIACAL SYMPTOMS

Hypochondriacal symptoms in a person less than 35 years old almost always turn out to be a symptom of an underlying schizo-

phrenic process. In older patients they may occur as a manifestation of a hypochondriacal neurosis, involutional melancholia, or other psychiatric conditions. The term hypochondriacal symptom is used here in a specific manner and refers to physical symptoms for which no structural or functional disorder is present. Hypochondriacal symptoms are distinguished from symptoms of conversion reactions (hysterical symptoms) and somatization reactions (psychosomatic symptoms). In both of these reactions there is a demonstrable dysfunction. In the former, the individual attempts to defend himself against anxiety by the production of a symptom with a symbolic meaning. In the latter, anxiety is dealt with by being channeled through one portion of the autonomic nervous system and causing dysfunction of an organ or organ system. By contrast, hypochondriacal symptoms bear no relationship to actual bodily dysfunction and are often described in bizarre terms. There are often associated fantastic ideas concerning a supposed physiologic disturbance. In these instances they approach actual somatic delusions. Hypochondriacal symptoms must be distinguished from odd symptoms or descriptions of symptoms which reflect physiologic and anatomic misinformation or ignorance. A patient may, for instance, state: "I have weak kidneys," but actually mean he has a pain in the back which he assumes is related to some kidney ailment.

A physical complaint may not initially appear to be unusual. As the patient elaborates on his symptoms, however, he reveals their peculiar nature. It may require careful questioning and alertness to recognize a symptom's true significance. For instance, an initial complaint of headache may be elaborated by a statement such as "not really a pain but a feeling like the top of my head is going to blow off; the discharge from my nose indicates that the pressure is causing some outflow of brain substance." In one case an initial complaint of numbness in the arms was later found to have a more complex meaning for the patient. He actually felt that there were bubbles of air in the veins of his arms. Furthermore he believed his symptoms were the result of people trying to poison him. Unlike conversion symptoms or psychosomatic symptoms, hypochondriacal symptoms are not influenced by reassurance, placebos, or explanation.

Any hypochondriacal symptom that occurs in a young person, especially if bizarre, necessitates a careful psychiatric evaluation to consider the possibility of an underlying schizophrenic process.

#### ALCOHOLISM

Severe alcoholic over-indulgence in a young person should alert the medical officer to the possibility of a schizophrenic process. Occasional use of alcohol in the teens or early 20's is of little significance in itself, but when alcoholic intake is f

quent and results in severe intoxication, an early schizophrenic process must be considered. This is especially true when alcohol is consumed for the purpose of decreasing overt anxiety or marked feelings of inferiority and inadequacy. It is of less significance when used in an effort to decrease mild social anxiety or an effort to prove that one is able to drink and is therefore mature. If a young adult patient gives a history of repeated alcoholic amnesia ("blacking out spells," "pulling a blank"), there is greater likelihood of a severe emotional disorder, which may be a schizophrenic process. Although alcohol allows the schizophrenic to make a temporary adjustment, it further interferes with his reality testing and a definite psychotic picture finally results.

### CONVERSION SYMPTOMS

Gross conversion symptoms such as hysterical paralysis of an extremity, hysterical blindness, and epileptoid seizures always suggest the possibility of a schizophrenic process, and when carefully evaluated, the patient with such a symptom is frequently found to be schizophrenic. Unless a patient with a marked conversion symptom falls into one of the following two categories, the author has found it convenient to presume him to be schizophrenic until proved otherwise:\*

1. Mentally defective or borderline mentally defective patients: Such patients may develop conversion symptoms when placed in situations with which they are intellectually or emotionally unable to cope.

2. Patients from unique cultural areas: Gross conversion reactions are fairly common in certain culturally backward areas of the United States and are well known in Puerto Rico. The frequency of bizarre epileptoid convulsions among Puerto Rican patients is common enough to have been labeled the "Puerto Rican syndrome" by some psychiatrists.

Many specific instances are known where improper management resulted from failure to recognize the basic schizophrenic process in patients who presented conversion symptoms. The consequent occurrence of acute severe psychotic episodes required electroconvulsive treatment and prolonged closed ward care. In some cases the patient failed to regain even his previous level of adjustment.

### PLASTIC SURGERY CANDIDATES

Patients who request facial plastic surgery in the absence of actual or significant disfigurement are frequently schizophrenic. This is especially true of those who seek operations for plastic surgery on the nose. The intense desire they express for such

\*This is not intended to imply that there is no diagnostic entity of conversion reaction. It is beyond the scope of this article to discuss conversion reactions per se.

operations is not reduced by careful explanation regarding the indications for plastic surgery and its limitations. Their desire for correction of minor or nonexistent disfigurements are actually early feelings of depersonalization and withdrawal from reality. Plastic surgery may precipitate a full-blown psychotic reaction in early or insidious cases of schizophrenia.

### TINNITUS

Occasionally a chief or sole complaint of ringing or buzzing in the ears in the absence of demonstrable organic cause may be the only indication of a schizophrenic process. Such ringing or buzzing in the ears precedes the development of auditory hallucinations and other indications of an overt psychosis. Patients often disclose that the ringing resembles a rumble of voices but that they have been reluctant to report this to the medical officer. If the underlying schizophrenic process is unrecognized, repeated unrewarding special examinations result.

### SUMMARY

A few clinical hints have been given for the early recognition of schizophrenia. Teaching experience has shown that the significance of certain symptoms and signs are not universally recognized and are not stressed sufficiently in standard textbooks of psychiatry. None of the symptoms or signs mentioned are in themselves pathognomonic of schizophrenia. They should, however, alert the medical officer to the possibility that he is dealing with a basic or underlying schizophrenic process. All too frequently, patients who have early or insidious forms of schizophrenia are not recognized and are mismanaged. Often the result is repeated needless laboratory work or consultations. Sometimes mismanagement results in severe schizophrenic reactions which require prolonged hospitalization and treatment. Most unfortunate are the acts of violence and the suicides that may occur.

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# PROJECTIVE SOUND TESTING OF EMOTIONALLY ILL PATIENTS

DENNIE L. BRIGGS, *Lieutenant, MSC, USN*  
DAVID C. GAEDE, *Rear Admiral, MC, USN (Ret.)*  
HARRY A. WILMER, *Commander, MC, USNR*

**O**BJECTIVE psychologic studies of sound perception and sound association have been few, compared to the many studies of visual perception. Particularly great emphasis in psychologic testing has centered upon the Rorschach and Thematic Apperception Tests, but what is seen and how something is seen is no more important than what is heard and how something is heard.

In general, two types of sound association experiments have been reported in the literature. Skinner<sup>1</sup> described a verbal sum-mator, later called the tautophone. This is a device for repeating arbitrary samples of speech obtained by permuting and combining certain elemental speech sounds. The repetition of samples may evoke various associations. This method for studying latent speech and projection was then utilized clinically by Shakow and Rosenzweig.<sup>2</sup> Stone<sup>3</sup> presented an auditory apperception test to elicit responses in story form. Here subjects were instructed to write or tell the story based on the sounds they heard. More recently, Davids and Murray<sup>4</sup> reviewed the literature and presented their "azzageddi" test, which deals with interpretations of direct statements or projections that the subject culls forth.

A study of sound associations that we pursued during the past five years resulted in the development of a series of 21 carefully selected sounds, each lasting from 20 to 50 seconds. These were recorded on two records, which are available to others for research purposes.\* Descriptions of how the sounds were obtained from real life and how they were selected and recorded have been published elsewhere.<sup>5-7</sup>

This article reports certain features from the responses to these stimuli by Navy and Marine Corps patients from the psychi-

Presented at the annual clinical sessions of the American Medical Association, Boston, Mass., December 1955.

From the U. S. Naval Hospital, Oakland, Calif. Lt. Briggs is now at the U. S. Naval Hospital, Navy 3923, FPO, San Francisco, Calif.

\*Inquiries regarding these records should be addressed to: Naval Medical Research Institute, National Naval Medical Center, Bethesda, Md. (Attention Comdr. H. A. Wilmer).

atric service in this hospital. The sample is a group that was carefully selected, not according to psychiatric diagnosis, but on the basis of a history of recent experiences in which sound played a significant part. By significant sound experiences we mean (1) traumatic events such as explosions, crashes, or gunfire, and personal sound distortions such as hearing defects, organic or hysterical; (2) psychotic sound imagery such as auditory hallucinations in which the sound quality as well as the content was of importance; and (3) unusual sound training necessitated by such service experience as sonar or listening duties, piloting a jet, or serving on a submarine. Each patient then could be thought of, in a measure, as a "sound casualty."

The technic of testing differed from the customary manner in which a psychological test is given by a specialist. Instead, the sound stimuli were used much as one would use Sodium Amytal, to stimulate anamnestic recall in order to obtain replies to specific questions relating to sound associations and apperceptions. To this end the testing was conducted by the therapist or the would-be therapist. It is of real value that the therapist himself actually hears the patient's response and notes his voice, attitude, and manner, because the insight into a patient's conflict or personality that is obtained is of immediate practical value in his care. The method is thus a device in the physician's armamentarium that may help him to obtain specific answers. This does not mean that extensive quantitative studies should not be simultaneously pursued, as is indeed being done, but that the practical usefulness of the method in treating patients need not depend upon such studies.

### THE EXPERIMENT

The sample consisted of 31 Navy and Marine Corps officer and enlisted personnel, ranging in age from 17 to 41 years. All were men, and 23 per cent had participated in combat during World War II, the Korean conflict, or both. All were hospitalized for psychiatric problems, including character disorders, neurotic difficulties, and psychotic states. Three patients were deaf in one ear, 12 had been treated with Serpasil (brand of reserpine), two had had deep insulin coma following early schizophrenic episodes, and at least three were experiencing auditory hallucinations during the time they were studied. Three were qualified submariners, one was a jet pilot, and two were senior naval officers.

The experiment consisted of presenting the patient with a series of 21 sounds—some taken from the environment, such as the radio, home, playground, and railroad station, and some selected from sound tracts of movies. The patients were told:

You are going to hear a series of recorded sounds. Some of these will be familiar, some strange. All sounds have

associations—they bring memories, stories, thoughts, or feelings to mind. This is true of music, cries, words, et cetera. Sounds have different meanings to different people. We are interested only in the meaning these sounds have for you. Tell me what your first thought is—what comes to your mind—what the sounds tell you. If you wish you may make up a story . . . .

Responses of each patient to each sound were tabulated and analyzed for accuracy of perception, unpleasantness or signs of emotional involvement with particular sounds, the use of sounds to recall personal experiences, and the elicitation of material alien or completely extraneous to the sound stimuli being presented.

**Accuracy of Sound Perception.** Not only do sounds have associations, but they call forth "sound illusions" or "mishearing" in certain individuals. The illusion is the result of mishearing or misinterpreting real auditory stimuli. Owing to established habits of rapid association or the temporary "set" of the mind, the listener mistakes the actual sound for something different. Total misperceptions of individual sounds ranged from 6 to 13 per cent, the highest being reported on a sound involving an aggressive male and a retaliating female. Here a recorded dialogue between a man and a woman, culminating with the woman declaring, "Well, I wouldn't talk if I were you," was heard variously as "I wouldn't take it if I wore you" (by a patient who went on to say that his own wife wouldn't be so quiet in that situation and that he'd rarely say such things to her), as "You certainly had nerve," and as "I wouldn't be ashamed if I were you." Another patient didn't even hear the sentence because he was upset by the preceding material.

In regard to the various sounds involving people, condensations of dialogue occurred, seemingly through selective hearing and the placing together of words that would make the final phrase coincide with the patients' own thinking. Total mishearing of one sound involving a young man calling for help amidst a crowd was observed with three patients, who reported the man as saying, "No." The sound reminded one of these patients of someone thrown to the lions, with people cheering as he was being punished. In relation to sounds involving situations other than people, for instance, the sound of running water with music being played in the background, misperceptions also were noted. One patient interpreted this sound as "still water" and then used this misinterpretation as a springboard for telling about his father's liking for the mountains, his father's desertion, his own guilt at having sided with his mother against his father, and how he felt guilty about this now and consequently had joined the service. Slips of the tongue in reporting the associations also occurred,

as in the following example with the sound just mentioned. A depressed patient whose wife had recently left him, taking their child with her, mentioned he had heard a "symphony" (symphony), while a patient with claustrophobia heard the sound as "someone in a vase" stirring liquid. When examining the life histories and present difficulties of the patients, their distortions, misperceptions, and slips in interpretations have direct bearing on their individual personalities.

**Affective Tone.** In analyzing the patients' responses, we were particularly interested in the affective quality of their associations. The protocols were scanned for material explicitly stated by the patient that would reveal his present emotional state. It soon became apparent that unpleasantness or sadness was prevalent in the protocols, and even with such rigidly applied criteria as verbal statements themselves, we found up to 23 per cent of the responses to any one sound eliciting associations of sadness, unhappiness, or depressed states. A somewhat moving sound, produced by a man reciting a sad poem against a background of organ music, elicited associations involving the funeral of a patient's father, an active hallucinatory episode involving an upraised arm about to strike someone, and projections of unhappy themes in radio programs, motion pictures, and church sermons, all with personal reference to sadness. It was found that in general the highest numbers of depressed or sad themes occurred with sounds involving human participation, and were especially apparent in relation to calls for assistance, unhappy states such as crying, and tense states involving arguments and aggressiveness. It is believed that the response to sounds portraying human situations calling for action on the part of the listener revealed the inadequacies for which the patients had had to be hospitalized. Their own ineffectualness in dealing with interpersonal relations was thus mirrored in their associations to the sounds.

**Personal Experiences.** In many instances the sounds had so much meaning to the patients that direct interpretation was entirely avoided, and the sound became merely a stimulus to recall a personal and sometimes deeply moving past experience. The frequency with which this occurred with each of the 21 sounds ranged from 7 to 26 per cent. As expected, those sounds involving human participation brought forth the greatest number of these experiences. The majority were concerned with early events or those involving the immediate family. A sound of a parent-child conflict stimulated comments such as "My own rebellion against my parents . . . ." "Like me disciplining my oldest boy . . . ." "Just like myself . . . getting beat up all the time . . . ." "We were treated like soldiers in that home . . . . Is that what a home is really like?" (This last patient was raised in an orphanage and to him the sound suggested movie and TV themes of family



life in an actual home.) Another patient recalled, "My Dad talking to me for something I done wrong," and another, "Sounded like my little boy—someone's going to whip him." On a sound involving a man and woman alternately crying, one patient recalled, "Like a crying jag I had in Pearl Harbor . . . ." Another patient responded with, "Reminds me of myself—the voices," and "Like I was in a funeral home."

The power of sounds to bring forth personal experiences that have direct bearing on the illness of the patient is important diagnostically as well as therapeutically. However, it is not known if the sound perception constitutes material unique to this mode of perception—that is, if anything is revealed through this mode that could not easily be gained through interviews or other projective tests involving visual perception.

**Extraneous Material.** In some of the associations, there were remarks or meanings that seemed to be completely outside the range of the stimulus. At least one such association occurred with each sound. The greatest number (10 per cent) were related to the sound of the parent-child conflict. They occurred mainly in areas where the patient displayed considerable affect, such as disgust, fright, or sorrow. In one case a patient with a hyperalarm reaction asked, "Have you ever noticed the shadow on your wall made by the fan?" He had associated the shadows with the faces of Lincoln and Washington, which was an almost total rejection of the actual sound stimuli. The patient's own history is not lacking in father-son conflict.

Some of the material was set off by the association itself, as if it awakened other memories of the past. Sometimes the patients went on to give personal opinions and reveal wishes, such as: "The old man deserved to have a couple of his arms broken or shot off," and then went beyond the sound in their associations. When presented with a sound of someone walking, one patient recounted his experiences in Korea while another talked of the crying of small children being kicked around.

Extraneous material, either given as associations or stimulated by the sound, plus the association itself, seemed to be related to misperceptions, and in most instances was directly connected with material in the patient's life history.

### CASE REPORTS

Two case studies are presented briefly, to illustrate possible applications of sound associations and their meanings in specific sound situations.

**Case 1.** A Navy pilot was hospitalized with paralysis of the lower extremities. Although his illness was eventually established as a conversion reaction and confirmed by numerous civilian and military con-

sultants, he could not accept the idea that his difficulty could have any psychologic basis, although it had occurred immediately prior to his squadron being sent to sea. His sound associations and behavior during the sound testing offered confirmatory evidence as to the nature of his difficulties and gave even greater insight into the nature of his thinking. The manner in which he reported his associations, using phrases such as, "It's quite obviously . . ." "No question about that one . . ." "I'm sure that was what it was . . ." et cetera, gave indications of his use of rigid, concrete thinking. His rationalizations and denial of emotion supplied further insight into his illness. Typically he stated, "I have no personal associations to the sounds—they do not apply to me," and "I don't suppose you could say that the people were crying . . ." Qualifying and justifying were too frequent not to have meaning.

**Case 2.** A young married submariner entered the hospital with a diagnosis of possible epilepsy. He had been in the conning tower of a submarine when an explosion occurred in which several men lost their lives. The patient revealed that he was impressed with the fact that such things could happen, and had conscious fears that an explosion might occur again. He also reported having "accident dreams" following the explosion. His sound associations were replete with specific anxieties concerning space, movement, and threat. The submarine, being the epitome of controlled environmental stress, became a realistic and threatening sound situation.

While submerged, the submariner lives entirely in a compartmentalized sound world, where sound is his only means to gauge reality. Reaction to sound situations (stimuli)—for example, the diving alarm, the surfacing alarm, and sonar pings—are means of expedient communication requiring action more rapid than human verbal means will allow. In an enclosed chamber where there are crowded a fantastic number of instruments and indicators which are the only points of reference to the outside world, a submariner's optimum function requires the epitome of control. In contrast, the aviator lives in a world where visual representations of reality are experienced as well as the sounds of his machine with which he closely identifies himself as he relies on his instruments for his cues to action.

### SUMMARY

Sound associations were obtained from 31 Navy and Marine Corps patients, each of whom had had some significant sound experience in his recent life in the military situation. Their responses were analyzed in terms of accuracy of perception, emotional involvement, recall of personal experiences, and elicitation of extraneous material evoked by the sound stimuli. Two cases are presented, illustrating possible applications of projective sound testing.

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## THE FUTURE OF MEDICINE

Looking into the future we must admit that healing will no longer be the main task of the physician although still a very important one. Medicine must by necessity become preventive medicine. There is no point in letting people break down and suffer from preventable diseases. There are enough sources of suffering in the world that may not be prevented so easily. The major tasks of medicine will be the maintenance and promotion of health, the prevention of disease, healing when prevention has broken down, and finally the social rehabilitation or reintegration of the former patient into society. The doctor's place will no longer be in his office where he would sit waiting for patients; it will be the factory, the mine, the farm, the ship, wherever people convene for work. His headquarters will be the Health Center. Such a program obviously requires the close cooperation of the physician with educators, physical culturists, social workers, administrators, and statesmen. The relation between medicine and sociology will be a very close one.

—HENRY E. SIGERIST, M. D.  
in *International Record of Medicine  
and General Practice Clinics*  
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# THE TECHNIC OF CIRCUMCISION USING LOCAL ANESTHESIA

RICHARD D. AMELAR, *Captain, USAF (MC)*

**R**EDUNDANT prepuce and phimosis produce 26 per cent of all admissions for diseases of the genito-urinary system to Air Force facilities for treatment.<sup>1</sup> The figure for circumcision is not reported concurrently, but it must be presumed that this is the fate of most of the cases in this category. On the basis of these figures it is obvious that several thousand circumcisions are performed annually throughout the military services, and that there is a concomitant high loss of effective manpower. For military expediency, the morbidity involved with the procedure of circumcision, and the attendant period of hospitalization, must be kept to an absolute minimum.

Recently, in a tour of hospitals, I was impressed with the totally unnecessary risks involved in routinely performing a high proportion of circumcisions under spinal or general anesthesia. At these hospitals, the patient is admitted at least one full day prior to circumcision and is kept there for from 5 to 10 days post-operatively, and even longer in the instance of the development of postspinal headaches or aspiration pneumonitis.

It would seem appropriate, then, to describe a simple technic for the performance of circumcision under local anesthesia. The patient can be admitted to the hospital the day of the circumcision and discharged to duty on the following day, with a total loss from duty of only 24 hours. Indeed, several medical officers and medical corpsmen promptly returned to duty following circumcision.

There is nothing original about the technic set forth below. It combines the best parts of several different recommended procedures and has evolved into a reliable procedure with a minimum of technical difficulty. It can be easily performed by any medical officer.

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From 6604th U. S. Air Force Hospital, APO 862, New York, N. Y. Dr. Amelar is now at 77 Park Ave., New York 16, N. Y.

## CONSIDERATIONS

As a preoperative medication, a barbiturate is used to produce psychic sedation and to minimize the minor systemic reactions to local anesthetics, evidenced by apprehension and psychic irritability, which may infrequently occur. For these reasons, 0.2 gram (3 grains) of Seconal (brand of secobarbital sodium) is given orally one hour prior to circumcision. No other premedication is necessary.

A 1 per cent aqueous solution of Xylocaine (brand of lidocaine hydrochloride) has been found to be the anesthetic agent of choice, but when this is not available, procaine hydrochloride may be used with satisfactory results. Xylocaine has the great advantage of having a faster and more prolonged action than procaine, with twice the potency and fewer side effects. For this procedure, a maximum of 15 to 20 ml of the 1 per cent solution is used, and this dosage is well within the limits of safety. Epinephrine is not added because its vasoconstrictor action may result in a bloodless operation, thereby masking small bleeders and increasing the possibility of hematoma formation.

Circumcision sutures should be of interrupted 0000 plain catgut on a small cutting-edge needle. The catgut is readily absorbed and the sutures fall out easily after the wound has healed. A continuous suture would tend to form a noose about the penis, and in the event of an erection produce painful strangulation. Furthermore, should a continuous suture break prematurely, the entire wound would separate.

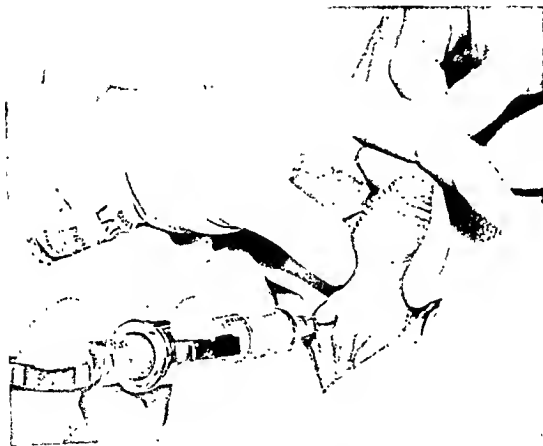
The nerve supply of the penis is derived from the pudendal nerves which divide on each side into two main branches, the dorsal and the perineal nerves. The dorsal nerves supply the skin on the dorsolateral aspects of the penis and send terminal filaments to the glans. The perineal nerves subdivide into posterior scrotal and muscular branches. The posterior scrotal nerve may send filaments to the ventral portion of the penis.

## METHOD

The area is prepared for circumcision by shaving the hair from the region of the base of the penis, then thorough scrubbing with surgical soap, and rinsing off with sterile water, followed by a 1:1,000 aqueous solution of Zephiran (brand of benzalkonium chloride). Alcoholic solutions of Merthiolate (brand of thimerosal) are not used because these can be highly irritating to the sensitive skin of the scrotum. If the prepuce cannot be retracted to clean the glans, this is done as soon as the glans is exposed by the dorsal slit.

The dorsal nerves are blocked on each side at the lateral aspect of the base of the penis. Using a 23-gauge needle, a skin wheal

is raised, and then the needle is inserted perpendicularly through the subcutaneous tissues until a definite sense of tissue resistance is felt. This resistance (Buck's fascia) is just pierced by the needle, and then after aspiration (to be sure that the needle is not within a blood vessel) 4 ml of the 1 per cent Xylocaine solution is injected (fig. 1). This procedure is repeated on the opposite side. The subcutaneous tissues on the dorsal and ventral aspects of the base of the penis are then infiltrated with 3 ml of solution each. The penis is now completely anesthetized and the circumcision may be performed. If procaine is used rather than Xylocaine, it will be necessary to wait approximately from 5 to 10 minutes before the anesthetic takes effect.



*Figure 1. Injection of anesthetic beneath Buck's fascia.*

A crushing Kelly clamp is applied to the dorsum of the prepuce in the midline and two small hemostats are used for retraction. The clamp is removed and the prepuce is cut along the crushed line, producing an almost bloodless incision. Care must be taken not to injure the glans or urethra (fig. 2). The incision is extended along the inner surface to a point 1 cm from the coronal of the glans. A suture is inserted through mucosa and skin at the apex of this incision (fig. 3). The ends of this suture are left long and are clamped for retraction during the rest of the procedure.



*Figure 2. Incision on dorsal aspect of prepuce.*



*Figure 3. Placement of suture at apex of dorsal incision.*

If only a dorsal slit is desired rather than a complete circumcision, the operation can be terminated at this point by the insertion of a few interrupted sutures along the skin margins. The prepuce is now rolled back completely and the exposed glans is thoroughly swabbed with the Zephiran solution. Using two small hemostats for retraction, a crushing Kolly clamp is applied to the midline of the ventral surface of the prepuce. The clamp is removed and the prepuce is cut along the crushed line, again stopping the incision at a point 1 cm from the corona of the glans. A second suture is inserted through the skin and mucosa at the apex of the ventral incision. The ends of this suture are also left long and clamped for retraction. Using the two sutures as a guide, and using hemostats to stretch the prepuce, the prepuce is cut off on one side (fig. 4), leaving a 1-cm margin around the corona. The same procedure is repeated on the other side. The glans is retracted by the assistant's finger, using a gauze sponge to prevent it from slipping.



*Figure 4. Excision of redundant prepuce between dorsal and ventral incisions.*

Small bleeding points are controlled with hemostats and 0000 catgut ties. This step is most important to prevent postoperative hematoma formation. A suture for retraction is now inserted on each side, midway between the dorsal and ventral sutures. This divides the circumference of the incision into four equal quadrants, with a retraction suture at each corner. With the assistant



holding two adjacent retraction sutures, the skin edge and the edge of the mucosa are easily approximated with three evenly spaced interrupted sutures in each quadrant. The underlying subcutaneous layer is not included in the sutures. This ensures mobility in the area of approximation of the edges of the incision. The long ends of the retraction sutures are cut and a layer of gauze impregnated with petroleum jelly is placed over the incision. A bandage is applied fairly tightly to the end of the penis as another precaution against hematoma formation.

### POSTOPERATIVE CARE

Postoperatively, the patient may be ambulatory. Codeine sulfate is given orally to control any pain the patient may have in the immediate period following the circumcision, but there is no need for it after the first day. The discomfort occasioned by infrequent erections lasts only a day or two. We have not found it satisfactory to administer estrogens for the control of erections, because these drugs may have an unpredictably long action, which may be more distressing to the patient psychologically than the few erections which cause him discomfort.

The bandage is removed on the first postoperative day and the patient is started on warm soaks four times a day. For this purpose an ordinary drinking glass half filled with warm water is satisfactory. No antibiotics are necessary. All discomfort disappears by the second postoperative day. The soaks are continued until all the sutures fall out, which may take four or five days, but the patient can be back on duty and need not be hospitalized for this.

### SUMMARY

The use of spinal or general anesthesia for routine circumcision in adults is condemned as being unnecessary and hazardous. A simple, safe, and most effective technic using local anesthesia is available and is especially suitable for use by the military medical officer. Only 24 hours of hospitalization are required when this technic is used.

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*The difference between lunch and luncheon is two dollars.*

—Martin H. Fischer

# DIAMOX IN PREECLAMPSIA

HUMBERT L. RIVA, *Lieutenant Colonel, MC, USA*  
WOODROW L. PICKHARDT, *Lieutenant Colonel, MC, USA*  
MERRILL M. BECKER, *Major, MC, USA*

**A** STUDY in the management of preeclampsia was conducted at this hospital throughout 1954 and 1955 to compare the diuretic effectiveness of Diamox (brand of acetazoleamide) to that of ammonium chloride and of bed rest alone. Two hundred and twenty-five patients having mild or moderate preeclampsia with fluid retention were admitted during this period. The diagnosis was based on the criteria set forth by the Committee on Maternal Welfare.<sup>1</sup> Toxemias of pregnancy other than preeclampsia were excluded from the study. The following procedures were prescribed for all patients:

## *Diagnostic determinations:*

Blood chemistry studies to determine blood urea nitrogen, carbon dioxide combining power, albumin/globulin ratio, sedimentation rate, uric acid, and sodium chloride, on admission and repeated on the fifth day.

Complete blood count and hematocrit on admission.

Weight on admission and daily thereafter before breakfast.

Blood pressure and fetal heart tones twice daily.

Complete urinalysis, including determination of acetone and diacetic acid, every other day.

Twenty-four-hour quantitative urinalysis for albumin three times weekly.

Twenty-four-hour urinalysis for sodium daily.

Daily fluid intake and output.

Fundusoscopic examination.

## *Therapeutic regimen:*

Bed rest with bathroom privileges.

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From Walter Reed Army Hospital, Washington, D. C.

Diet: 1,000 calories, 200 mg sodium, high protein.

Phenobarbital, 0.03 gram, four times a day.

One multivitamin capsule daily.

Ferrous sulfate, 0.3 gram, three times a day.

Of the 225 patients, 78 were eliminated from the study because they were delivered during the period of management. Sixty of the remaining 147 were given 250 mg of Diamox daily for five days, 42 were given 9 grams of ammonium chloride in divided doses daily for five days, and 45 were placed on bed rest alone for the same length of time.

### RESULTS

The mean results of similar data from all patients are shown in table 1. The age, gravida, parity, weight at the beginning of pregnancy, weeks' gestation before edema appeared, weight on admission, and total weight gain were comparable for the three groups of patients.

TABLE 1. Comparison of average weight changes in 147 patients with preeclampsia of pregnancy

Data	Mean results in patients treated with		
	Diamox (60 patients)	NH <sub>4</sub> Cl (42 patients)	Bed rest (45 patients)
Age	26.63	26.98	26.80
Gravida	2.03	2.17	1.87
Parity	0.89	0.16	0.80
Weight at beginning of pregnancy	140.8	137.9	145.0
Week edema manifest	34.5	36.1	34.4
Weight on admission	167.7	164.1	171.5
Total weight gain	26.9	26.2	26.5
Weight loss after five days of therapy*	9.6	7.8	7.2

\*Average

After five days of therapy the average weight loss in those patients treated with Diamox was 9.6 pounds, as compared with an average weight loss of 7.8 pounds in those treated with ammonium chloride and of 7.2 pounds in those who were on bed rest alone.

Of the 60 patients treated with Diamox, several had paresthesias and several had blurring of vision caused by ciliary spasm.

These symptoms were transitory. There was one case of hematuria, thought to be the result of the sulfonamide-like structure of Diamox,<sup>2-11</sup> inasmuch as the patient was known to be sensitive to sulfonamide and had had a similar toxic manifestation.

### DISCUSSION

In view of the comparability of all the figures obtained, with the exception of the weight loss of the 60 patients given Diamox therapy, it seems probable that Diamox has clinical significance as an adjunct in the treatment of preeclampsia. It is a diuretic and acid base regulator of low toxicity. Peripheral and circumoral paresthesias occur in some patients, but are mild and transitory. Drowsiness, mild acidosis, blurring of vision, and fever with rashes such as those observed with sulfonamides sometimes occur.

Diamox is a nonbacteriostatic sulfonamide derivative possessing distinctly different chemical structure<sup>12</sup> and pharmacologic activity than those of the bacteriostatic sulfonamides. It is an enzyme inhibitor, acting specifically on carbonic anhydrase. Its diuretic effect is due to retardation of the reversible hydration of carbon dioxide and dehydration of carbonic acid reaction in the kidney. The result is renal loss of bicarbonate ion, which carries out sodium, water, and potassium; without loss of chloride. Diuresis and alkalization of the urine thus occur. Diamox is completely absorbed from the gastro-intestinal tract and is almost completely excreted unchanged in the urine in 24 hours.<sup>10,11</sup>

As adjunctive therapy in the elimination of excess fluid in the pregnant patient, a single daily dose of 250 to 500 mg is recommended. Therapy should be continued as long as control of edema is required. When oral therapy is impossible, the drug may be administered intravenously or intramuscularly in the same dosage as indicated in the oral form, but oral therapy should be prescribed as soon as practicable. Intravenous doses of from 750 mg to 1 gram have been used with impunity.

### SUMMARY

The effectiveness of Diamox in producing diuresis in patients having preeclampsia with edema was compared to that of ammonium chloride and of bed rest alone. The latter proved to be effective, and ammonium chloride added to bed rest was statistically no more effective. Diamox therapy, however, was about 20 per cent more effective in promoting diuresis than either bed rest alone or bed rest plus ammonium chloride.

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## PSYCHIATRIC ASPECTS OF THE MENOPAUSE

There is no single psychopathological entity in the menopausal period. The emotional illnesses of this time of life are not directly related to glandular deficiency but, rather, are the result of the individual's reaction to physiological, physical and environmental changes taking place. Significant dynamic factors are fear of the menopause itself, reaction to physical aging and loss of physical attractiveness, psychosexual conflicts, the end of the child-bearing period, the feeling of uselessness when the children are grown, and the death of loved ones. A prophylactic approach is indicated; in particular, a healthy and scientific attitude of the patient toward the menopause, and the development of personality assets and interests for the better use of leisure time.

—GEORGE J. WRIGHT, Jr., M. D.  
in *West Virginia Medical Journal*  
pp. 172-173, July 1954



## Clinicopathologic Conference

U. S. Naval Hospital, Portsmouth, Va.\*  
U. S. Naval Hospital, San Diego, Calif.\*\*

### DIABETES

#### *Case 1.*

**Summary of Clinical History.** A 34-year-old former Marine Corps major was brought to the emergency room of a naval hospital at 0515 hours on 25 June 1952. He was semicomatose on admission and within five minutes was comatose. He had been sent to the hospital by a civilian physician who had sent a note along with him stating that he had seen the patient at 0430 hours on the same day and that he thought that the patient was in diabetic or insulin shock, and recommended an emergency blood sugar. At the time, no further history was obtainable, but subsequently it was learned that he had a history of diabetes extending over a period of three years which was controlled by 20 units of insulin daily. In addition, it was learned that sometime during the previous three years he had spent a month at a Veterans Administration hospital where he was treated for cirrhosis of the liver. Ten transfusions were given him during the period of that hospitalization because of bleeding from his gastro-intestinal tract. He was treated again at a hospital for a period of three days in March 1952. Admission complaints then were weakness, fainting, dyspnea, and ascites. He had had "influenza" for the preceding few days and had taken insulin irregularly. There had been no vomiting or diarrhea. Stools were black but he had been taking some form of iron. The diagnoses on discharge were: (1) diabetes mellitus; (2) Laennec's cirrhosis, liver; and (3) secondary anemia. There was a history of "heavy drinking" for the preceding three years. He had worked

\*Rear Adm. O. B. Morrison, Jr., MC, USN, Commanding Officer. From the Pathology Service, Capt. Wilmot F. Pierce, MC, USN, Chief.

\*\*Rear Adm. Robert M. Gillett, Commanding Officer.

as a store manager for a paint company after his discharge from the Marine Corps. The day prior to the last admission, he had complained of general malaise and at approximately 0130 hours on 25 June 1952, when he was getting out of bed to go to the bathroom, had tripped on a waste basket in his bedroom and had fallen. At 0400 hours the doctor was called because the patient seemed semicomatose. The doctor advised, by telephone, that the patient be given a glass of orange juice and that he be called if there was no response. The physician was called again at 0430 hours, and when he arrived, the patient was stuporous and mumbled something about insulin. The doctor noted an "acetone breath."

**Physical Examination** On admission the patient was pale, and no blood pressure reading or pulse could be obtained. The heart sounds were regular, but weak and rapid. His lungs were clear, skin was dry, and his eyeballs were soft. Ascites and pitting edema of the ankles were evident. The spleen and liver were not definitely felt. There was areflexia. There were ecchymoses over the chest.

**Course in Hospital.** An emergency blood sugar determination was 204 mg per 100 ml; his urine was negative for sugar, acetone, and diacetic acid. He was given 10 per cent dextrose and water and 50 units of insulin intravenously. The admission note stated that this was started just before the blood was drawn for the blood sugar determination. One ampule of caffeine and sodium benzoate and one ampule of vasoxyl (brand of methoxamine hydrochloride) were given. The latter was repeated once. The patient did not respond to any of the treatment and died at 0645 hours on 25 June 1952, before any other investigative studies could be carried out.

### *Case 2.*

**Summary of Clinical History.** A retired white naval medical officer, 65 years old, was a patient in a naval hospital two times before his final admission. The first was in February 1948 because of polyuria, polydipsia, dry scaly skin, and pleuritis, all of which had been present for several months. He said that he had been completely well until a year before. However, there was a history of mesenteric thrombosis following bilateral thrombophlebitis which, in turn, had complicated varicose ulcers of both legs in 1940. No other significant past history was elicited. His father had died of carcinoma of the prostate gland. He was obese; his blood pressure 165/90 mm Hg. The liver edge was felt 4 cm below the right costal margin; there was hemosiderosis of both legs, and there was 2-plus edema of both lower extremities. His electrocardiogram was reported to be essentially normal. At that time he was found to have diabetes mellitus which was fairly easily controlled with 15 units of protamine zinc-insulin injection and 10 units of regular insulin plus a restricted diet. After a period

of 25 days he was discharged from the hospital. No liver studies were carried out at the time of that admission.

He was admitted again in February 1949 because of shortness of breath, a full feeling in his abdomen, and polyuria. He had made little if any attempt to control his diabetes during the period between these hospital admissions. His blood pressure was 180/80 mm Hg. There was ascites; the edge of the liver was palpable 3 cm below the right costal margin. Blood sugar was 296 mg per 100 ml; carbon dioxide combining power was 19.6 volumes per cent; sugar, diacetic acid, and acetone were all present in his urine. No difficulty was encountered in controlling his diabetes and he was discharged after 18 days with instructions to continue taking 25 units of regular insulin daily. During this admission, his cephalin-cholesterol flocculation was reported to be 4 plus in 24 hours; thymol turbidity was 2 units.

His last admission was on 29 July 1952, and he was comatose at that time. Members of his family stated that he had lapsed into coma the previous day. They also stated that they had noticed jaundice for the first time about two weeks before, and that the patient had had attacks of abdominal pain throughout the previous year, had eaten poorly for several months, and had used alcohol excessively.

**Physical Examination.** The patient was deeply jaundiced at the time of this admission. The liver was greatly enlarged, nodular, and hard, and the abdomen was distended with fluid. His blood pressure was 136/80 mm Hg.

**Laboratory Studies.** Hemogram and blood sugar were normal; blood urea nitrogen was 59.5 mg per 100 ml, and his urine was bile stained. An electrocardiogram showed only a prolonged Q-T interval.

**Course in Hospital.** An indwelling catheter was placed in the bladder, and he excreted about 500 ml of urine daily. Hydration was maintained with 2,000 ml of fluid daily consisting of 5 per cent dextrose solution, Ringer's solution, and normal saline, together with 20 units of insulin. His blood sugar remained normal. He did not gain consciousness and died at 0255 hours on 4 August 1952.

## DISCUSSION

**Doctor Critzer:**\* I am going to try to present these two patients today simultaneously, for they paralleled each other very closely. Both were very lackadaisical diabetics. Their diabetes was of relatively short duration—three years in the first case and four in the second. Both had evidence of fairly severe concomitant liver disease, and both, pre-

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\*Lt. Ben L. Critzer, MC, USNR, Medical Service.



sumably, were alcoholics, although in the case of the physician, the summary states only that an excessive alcoholic intake occurred in the few months prior to his final admission. It is likely that his alcoholic intake was excessive over a longer period of time.

Both patients had had two previous hospital admissions because of difficulties encountered in diabetic management and, what seems more significant, evidence primarily of liver dysfunction and its complications dominating an otherwise not so severe diabetic picture.

The major was first admitted for treatment of cirrhosis, and at that time multiple transfusions were necessary for massive gastro-intestinal bleeding, presumably from esophageal varices. A departure from diabetic management and an associated respiratory tract infection were the reasons for the second hospitalization. Ascites was found at that time.

The physician's first recorded hospitalization resulted in the initial discovery of his diabetes. Associated findings at that time were not only the usual symptoms and pathology of diabetes, but also hepatomegaly, moderate hypertension, "hemosiderosis" of both legs, and dependent edema. There was a past history of mesenteric thrombosis following thrombophlebitis of leg varicosities and ulceration some 12 years before. I am not quite sure that mesenteric thrombosis and thrombophlebitis of the leg are significant in relation to his diabetes. Perhaps they complicated an attack of pancreatitis.

His next admission, a year later, again was because of neglectful management of his diabetes, and at that time a rather severe state of diabetic acidosis developed. However, just as important at that time was the finding of persistent hepatomegaly; ascites had developed, and liver function studies indicated serious hepatic impairment.

On their terminal admissions both patients were comatose, both having become so only a short time prior to being brought to the hospital. The duration of the major's coma was a matter of only an hour or so. On the day prior to his last admission he had complained of general malaise, and a few hours before admission he fell in his room, became semicomatose, and did not respond after he was given some orange juice as advised by his doctor. When he was admitted, peripheral vascular collapse was evident, and he was dehydrated and deeply comatose. Ten per cent dextrose was started shortly before blood for sugar determination was drawn. The result of that determination was 204 mg per 100 ml. There was no clinical improvement and even though stimulants and vasopressor agents were administered, he died promptly.

This is to be considered a rather sudden and rapid demise even for a careless diabetic. That he had serious liver disease there can be no doubt, and with poor nutritional history and excessive alcoholic intake progression was to be expected. Perhaps there is no deadlier combination than diabetes and embarrassment of liver function. Since the liver figures importantly in carbohydrate metabolism and maintenance of a

constant blood sugar level, cirrhotics are extremely prone to insulin shock. Storage and release of glycogen by the liver require insulin, and in a poorly functioning or fatty liver a deficiency in this function develops since there is no place to put this important sugar. It is not hard to conceive of a rapid infusion of dextrose, even for a minute or two, raising the blood sugar to 200 mg per 100 ml, especially since it could not have had time to become evenly distributed throughout the extracellular fluid. Therefore I think it is most likely that this patient died of insulin shock. Although there was a history of a fall and possible head injury, and areflexia found on admission suggested the possibility of intracranial hemorrhage, it would be hard to distinguish between central nervous system embarrassment by massive hemorrhage and its embarrassment by deprivation of necessary nutrition. Injury to the chest at the time he fell should be considered, for this might have initiated another massive esophageal hemorrhage, but except for the profound shock there is nothing noted that would lend credence to this.

The physician, I feel, presented a different problem on his final admission. He had become jaundiced two weeks prior, and there was massive ascites and evidence of renal failure. In addition, his demise was not nearly so rapid; he remained comatose about one week before death. Insulin shock or diabetic acidosis do not seem to have been involved, for control of his diabetes was apparently maintained, at least according to repeated blood sugar determinations. I believe that the greater part of the evidence points toward cholemia or perhaps the so-called heparorenal syndrome. The presence of cholemia is difficult to prove clinically, for it has been stated that there are no specific findings, except laboratory findings of hepatic failure, that enable one to distinguish between hepatic coma and any other form of coma. These laboratory evidences do not necessarily show any marked change when a patient passes from a state of moderate hepatic dysfunction to what is known as cholemia. Because jaundice need not be present and neurologic findings are not constant, this is largely a diagnosis of anticipation.

Several things are mentioned in the summary which make one think of a basis for concomitant diabetes and liver failure in this patient. The history of chronic dry, scaly skin and hemosiderosis of both legs are frequent findings in hemochromatosis or bronze diabetes. But usually the diabetes is much more severe and requires more insulin for control than was necessary in this patient. The "hemosiderosis" is probably explained on the basis of incompetence and stasis in the veins of the legs, though hemosiderin deposition in the skin is not necessarily a constant in hemochromatosis. Organ involvement is the paramount manifestation. The development of jaundice and discovery of a very large, nodular, hard liver might suggest hepatic malignancy, which also is not too uncommon in hemochromatosis; the incidence is from 10 to 15 per cent.

I feel that, even though a normal blood sugar was found, the first patient died of hypoglycemia in the presence of diabetes and cirrhosis.

The second patient's final episode, I believe, was cholemia and/or "hepatorenal syndrome" resulting in coma—possibly on the basis of hemochromatosis or hepatic malignancy; but I will just stick to cirrhosis.

**Dr. Critzer's diagnosis:**

*Case 1.* Hypoglycemia with presence of diabetes and cirrhosis

*Case 2.* 1. Cholemia and/or "hepatorenal syndrome" in the presence of cirrhosis  
2. Diabetes mellitus

**PATHOLOGIC FINDINGS**

Doctor Pierce: Clinically, both of these men had diabetes and cirrhosis, and at autopsy both had large, cirrhotic livers. The liver of the first patient weighed 3,160 grams, and of the second, 3,850 grams. The incidence of the combination of diabetes and cirrhosis reported in the recent literature varies considerably—from less than 1 per cent to 24 per cent. Adhering to the concept that diffuse hepatic fibrosis develops as a reaction to the accumulation of some substance within the cytoplasm of the hepatic cells, which results in interference with the intralobular circulation and leads to malnutrition and degeneration of the parenchyma,<sup>1</sup> and that this is demonstrated in glycogen disease, adult Gaucher's disease, xanthochromatosis, Niemann-Pick disease, and occasionally in amyloid disease, we would expect the incidence to be high. One of the first experimental observations on diffuse hepatic fibrosis was that it developed in depancreatized dogs. That its development in such dogs can be prevented fairly well by adequate therapy with insulin and diet has been shown.<sup>2</sup> The descriptions of the livers of diabetics in the pre-insulin days frequently mentioned that they were cirrhotic or fatty. Generally good management of diabetes probably accounts for the present less-frequent occurrence of the combination. This is reflected in the reports in the literature; the highest incidence is reported from hospitals and clinics where good control of diabetics is not possible. Conversely, a damaged liver may cause disturbances of blood sugar levels, including hyperglycemia. Whether or not this type of hyperglycemia can be called diabetes mellitus depends, as pointed out by Spellberg,<sup>3</sup> on the definition of diabetes, but when it occurs in patients with diabetes, it may complicate this disease severely. Hypoglycemia as a result of liver damage, on the other hand, may result in apparent improvement in a diabetic. The ease of control of the disease in the two patients discussed today, especially terminally in the second, may well have been due to the concomitant cirrhosis.

In the first patient, bleeding from the gastro-intestinal tract had occurred at least once prior to the last admission to the hospital. Definite esophageal varices were not noted at autopsy, but there was a small, active ulcer on the posterior wall of the duodenum. The role of portal hypertension as a cause of peptic ulcer has been stressed by

Palmer.<sup>4</sup> From his gastroscopic observations in cirrhosis, he thought that both ischemia, as governed by shunting of arterial blood away from the mucosa, and plethora, incident to portal hypertension, may lead to mucosal hypoxia and the development of erosions. There is no doubt that esophageal varices are the most usual source of bleeding in gastrointestinal tract hemorrhage occurring in cirrhosis of the liver, but peptic ulcers, especially superficial ulcerations, occur in numbers significant enough to indicate that there is a causal relationship, and that the assumption that bleeding in patients with alcoholism is from esophageal varices is dangerous.

The influence of diabetes as a cause of peptic ulcer is less clear. In most clinics, the reported incidence is very low. Palmer, in discussing drugs and gastric mucosal injury, included insulin among the drugs that produce such injury, and he cited work done by Hanke,<sup>5</sup> who found that high parenteral doses of insulin caused distinct macroscopic and microscopic mucosal alterations in eight of 10 cats. Acute erosions occurred throughout the stomach, especially in the distal portion. The distal esophagus and proximal duodenum were also involved. One reason, of course, for a low incidence of peptic ulcers in diabetics is the fairly frequent finding of achlorhydria, as was found in 32.8 per cent of 399 diabetics studied by Joslin and associates.<sup>6</sup> This number, at least, can be considered as not being candidates for peptic ulcer. In a study of hypoglycemia in relation to duodenal ulcer, Beck<sup>7</sup> studied 96 patients to ascertain if there might be a greater incidence of hypoglycemia among patients with roentgenographically proven duodenal ulcer, and therefore with an increase of free hydrochloric acid, than in a control group. There were 47 in the group with duodenal ulcer who had free hydrochloric acid; of this number 51 per cent had hypoglycemia (70 mg per 100 ml or less). Forty-nine patients had no ulcer but had symptoms mimicking ulcer. Forty of these had free hydrochloric acid, nine had achlorhydria; five (12.5 per cent) with free hydrochloric acid had hypoglycemia. None of those with achlorhydria had hypoglycemia. If the hypoglycemia in persons with peptic ulcer is related to disturbed insulin secretion, namely, hyperinsulinism, we might infer that overzealous therapy with insulin or, again, poor regulation of insulin dosage might be important factors in the cause of ulceration of the stomach in diabetes, and especially if cirrhosis of the liver and portal hypertension are also present.

Disturbed gallbladder function was present in both of these men. In the first, there was atresia of the cystic duct with atrophy of the gallbladder, and in the second there was cholecystitis and cholelithiasis. There is a high incidence of diabetes in biliary tract disease due to infection, calculosis or functional obstruction.<sup>8</sup> Either may result in diabetes mellitus, pancreatitis, or in both, or at least in pancreatitis followed by diabetes. The cholecystitis and cholelithiasis probably accounted for the frequent attacks of abdominal pain in the second patient.

The immediate cause of death in the first patient was hemorrhage. However, the bleeding was not from any portion of the gastro-intestinal tract. The ulcer, which has been mentioned, showed no sign of recent bleeding. When this man stumbled and fell, the 10th, 11th, and 12th ribs on the left side were fractured, and the fractured ends lacerated the spleen. That hypoglycemia might have accounted for his stumbling as he attempted to make his way to the bathroom cannot be denied, for as Doctor Critzer has stated, the finding of a normal blood sugar after the patient had arrived at the hospital and dextrose had been started intravenously is no assurance that he did not have hypoglycemia.

In the second patient, as in the first, the complication of alcoholism was undoubtedly a potent factor in the inadequate management of his diabetes. There were no gross ulcerations of his esophagus or stomach, but there were large esophageal varices and multiple petechiae of the gastric mucosa and of the mucosa of the small bowel. In addition to his cholecystitis and cholelithiasis, there was a chronic pancreatitis. In the major's pancreas, there was an apparent decrease in the actual number of islets, and in the islets seen there were varying degrees of degenerative change—hyaline degeneration or active fibrosis.

The gross diagnosis of cirrhosis was confirmed microscopically in the livers of both men. In addition to the scarring, there was some degree of fatty metamorphosis in both (fig. 1). The complicating biliary

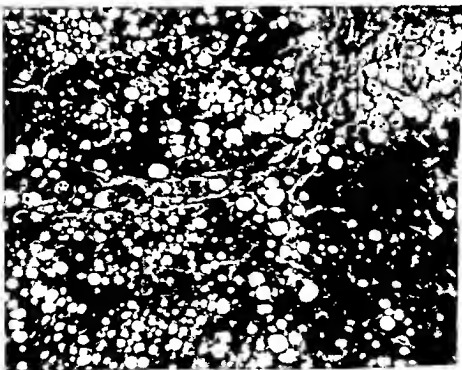
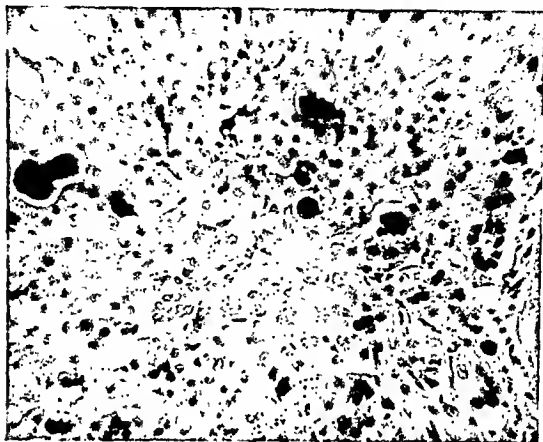


Figure 1 (case 2). Section of liver showing fibrosis extending into pseudolobules and fatty metamorphosis.

tract disease in the doctor's liver is evidenced by bile stasis in the canaliculi and by the very marked bile duct hyperplasia (fig. 2). Both



*Figure 2 (case 2). Section of liver showing bile plugging of canaliculi.*

of these occur in portal cirrhosis, but usually not to this degree. The over-all pattern of changes in this liver ate those of portal cirrhosis (fig. 3), and the changes are interpreted as portal cirrhosis with complicating biliary tract disease. The latter occurred late, it would appear, after the portal cirrhosis was well established. Both men had some degree of arteriosclerotic heart disease. The kidneys of both men showed a mild to moderate degree of change due to arteriosclerosis, and in the second patient there also was bile nephrosis. The doctor had grade II to III arteriosclerosis of the cerebral arteries, and an incidental finding of interest was a latent carcinoma in his prostate gland.

**Pathologic diagnoses:**

*Case 1.*

1. Traumatic laceration of spleen with exsanguination into peritoneal cavity
2. Fracture, simple, complete, left ribs 10, 11, and 12
3. Cirrhosis, liver (diffuse hepatic fibrosis)
4. Diabetes mellitus, clinical
5. Degenerative changes and/or fibrosis, pancreatic islets
6. Peptic ulcer, duodenum

*Case 2.*

1. Cirrhosis, liver (diffuse hepatic fibrosis) with generalized icterus
2. Diabetes mellitus, clinical
3. Cholecystitis and cholelithiasis and intrahepatic biliary tract disease
4. Pancreatitis, chronic and minimal, acute
5. Arterial and arteriolar nephrosclerosis and bile nephrosis



*Figure 3 (case 2). Section of liver showing dense portal fibrosis and bile duct hyperplasia.*

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## LIMITING DEFECTS OF ARMY INDUCTEES IN PHYSICAL CATEGORIES B AND C

BERNARD D. KARPINOS, *Ph. D.*  
GRACE SOUTHER

**I**T HAS been an established procedure in the Army since 1944 to profile each individual at the time of his physical examination for military service. The primary objective of the profiling has been to evaluate, on the basis of the physical examination findings, the individual's physical capacity from a functional rather than from a diagnostic point of view. This is particularly important with respect to individuals found qualified for military service.

Initially, the profile system was established for the purpose of providing an adequate qualitative distribution of the available qualified manpower between the various armed services—a distribution which was very much unbalanced during World War II and which had placed the Army, particularly the Army Ground Forces, in a very unfavorable position.<sup>1</sup> In addition, however, the profiling system aimed at a second, not less important, function; namely, assessing the individual's ability to perform particular military duties.<sup>1,2</sup>

The profiling has been accomplished by appraising the individual's functional capacity in terms of the well-known PULHES factors, which symbolize the following:

**P**—Physical capacity or stamina: Organic defects, age, build, strength, stamina, height, weight, agility, energy, muscular co-ordination, and similar factors.

**U**—Upper extremities: Functional use, strength, range of motion, and general efficiency of hands, arms, shoulder girdle, and spine (cervical, thoracic, and lumbar).

**L**—Lower extremities: Functional use, strength, range of motion, and general efficiency of feet, legs, pelvic girdle, and lower back (sacral spine).

**H**—Hearing (including ear defects): Auditory acuity as well as organic defects.



TABLE 2. *Percent distribution of U. S. Army inductees in physical categories B and C, by (missing defects and race (1953-1954)*  
—Continued

Defects	Physical category B			Physical category C		
	Total (%)	White (%)	Negro (%)	Total (%)	White (%)	Negro (%)
Genito-urinary system diseases						
Hydrocele	0.5	0.5	0.8	0.3	0.3	0.3
Other	0.1	0.1	0.2	0.1	0.1	0.0
	0.4	0.4	0.6	0.2	0.2	0.3
Skin and cellular tissue diseases						
Acanthosis	1.2	1.2	0.9	1.2	1.2	0.7
Other	0.4	0.5	0.1	0.4	0.4	0.0
	0.8	0.7	0.8	0.8	0.8	0.7
Bones and organs of movement, diseases and defects						
Osteochondritis	31.6	29.9	52.1	20.4	20.0	28.4
Internal knee derangement	0.3	0.4	0.1	0.4	0.4	0.1
Sacro-iliac joint affection	0.6	0.6	0.3	1.1	1.1	0.9
Diseases of the joint	0.2	0.2	0.0	0.3	0.3	0.1
Curvature of spine	1.1	1.1	0.5	1.4	1.4	0.9
Flatfoot	1.2	1.2	1.1	1.0	1.0	1.3
Clubfoot	20.2	18.4	42.9	7.2	6.8	13.9
Hammer toe	0.8	0.9	0.2	0.7	0.7	0.9
Shortening of lower extremity	0.2	0.2	0.4	0.1	0.1	0.2
Amputation of fingers	0.2	0.2	0.1	0.4	0.4	0.5
Limitation of motion	1.0	0.9	1.3	0.9	0.9	1.4
Deformities or impairments	1.9	1.9	1.9	2.4	2.4	3.4
Other	2.5	2.5	2.0	2.4	2.5	2.1
	1.4	1.4	1.3	2.1	2.0	2.7

TABLE 2. *Per cent distribution of U. S. Army inductees in physical categories B and C, by limiting defects and race (1953-1954)*  
—Continued

Defects	Physical category B			Physical category C		
	Total (%)	White (%)	Negro (%)	Total (%)	White (%)	Negro (%)
Congenital malformations	0.7	0.7	0.9	2.1	2.0	2.4
Undescended testicles	0.2	0.2	0.5	1.0	1.0	1.1
Other	0.5	0.5	0.4	1.1	1.0	1.3
Miscellaneous diseases and defects	8.1	8.1	7.6	8.3	8.2	9.8
Underweight	2.5	2.4	3.3	3.6	3.5	5.2
Overweight	2.3	2.4	2.1	2.0	2.0	2.4
Other	3.3	3.3	2.2	2.7	2.7	2.2
Population bases	57,809	53,334	4,475	38,903	36,869	2,034

It may be noted from the latter table that eye defects, diseases and defects of bones and organs of movement, and psychiatric disorders were the predominant limiting defects. Inductees with such defects comprised about 75 per cent of all inductees in both categories B and C. Refractive errors and defective vision were the most prevalent diagnoses among the eye defects, while the disease defects of the bones and organs of movement consisted mainly of "flatfoot." The psychiatric disorders were primarily psychoneuroses. In view of the large frequencies of these defects, the standards governing the profiling of these particular defects are given below:

#### *Vision*

Grade 2: Meets acceptable standards and his visual acuity will not be less than 20/200 in each eye correctible to 20/40 in each eye, provided the defective vision is not due to active or progressive organic diseases.

Grade 3: Meets acceptable standards with a minimum vision of 20/400 in each eye, correctible to 20/40 in one eye and 20/70 in the second eye, or 20/30 in one eye and 20/100 in the second eye. This classification also includes those individuals with any degree of defective vision in one eye from below 20/400 to no light perception if such defective vision is not due to active or progressive organic disease and if vision in the other eye is not less than 20/100 correctible to 20/20 with glasses.

#### *Flatfoot*

Flatfoot, as in the case of other defects of the lower extremities, is to be graded 2 if it does not prevent moderate marching, climbing, et cetera, or prolonged effort. It is to be graded 3 if it causes moderate interference with functions but allows sustained effort for short periods.

#### *Psychiatric Disorders*

Grade 2: Mild transient psychoneurotic reaction. Mild character and behavior disorders. Borderline mental deficiency.

Grade 3: Mild chronic psychoneuroses. Moderate transient psychoneurotic reaction. Mental deficiency, mild degree. History of transient psychotic reaction.

Eye defects were most prevalent among white inductees; flatfoot was most prevalent among Negro inductees.

### GENERAL PHYSICAL EVALUATION

For the general evaluation of the physical fitness of the inductees it seems important to relate the inductees with the most prevalent limiting defects to all inductees (categories A, B, and C), as done in table 3. This table indicates, for instance, that of

TABLE 3. Number of inductees per 1,000, by race, with selected limiting defects (grades 2 and 3) (1953-1954)

Most prevalent limiting defects	Number per 1,000 inductees							
	Grade 2			Grade 3			Grades 2 and 3	
	Total group	White only	Negro only	Total group	White only	Negro only	Total group	Negro only
Eye defects	56	60	23	46	50	19	102	42
Diseases and defects of bones and organs of movement	50	48	61	21	22	16	71	77
Psychiatric disorders	15	16	9	10	11	5	25	14

each 1,000 white inductees, 110 individuals (or 11 per cent) had eye defects (60 had an eye defect graded 2 and 50 had an eye defect graded 3), and that of each 1,000 Negro inductees, 77 individuals (or about 8 per cent) were graded 2 or 3 because of defects of bones and organs of movement, primarily flatfoot. It is worth noting that, although the latter defects were predominant among Negroes, in the total evaluation the proportion of Negro inductees with such defects was not much higher than that of white inductees; that is, 8 per cent among Negro inductees as compared with 7 per cent among white inductees. This is due to the fact that there are relatively fewer Negro than white inductees in categories B and C (table 1).

There were comparatively fewer Negro inductees with eye defects, both on a proportionate basis (table 2), and on an absolute basis (table 3).

The data indicate that about 2.5 per cent of the inductees were diagnosed as having some psychiatric disorder, nondisqualifying under the present psychiatric standards. It should be noted that the psychiatric requirements were lowered after World War II.<sup>4</sup>

There are no comparable diagnostic data, as presented in table 2, for enlistees profiled as physical category B or C. It seems, however, that it would not be unreasonable to assume that their diagnostic distribution is likely to be basically the same as those of inductees, though the enlistees differ from the inductees in their proportional distribution by physical category, as indicated above (table 1). Presumably, the diagnostic distributions given in table 2 may be taken as essentially representative of categories B and C of all accessions—enlistees and inductees.

#### SUMMARY

Based on the PULHES profiling system established by the Army in 1944, all individuals entering the military service are classified in terms of physical categories A, B, and C. This classification is an evaluation of the individual's physical capacity from a functional rather than a diagnostic point of view. Physical category A represents over-all physical capacity above the average, with no physical or minimal physical defects; category B represents over-all average capacity, involving some mild (nonprogressive) physical defects; category C indicates physical capacity below the average, with moderate (borderline) physical defects. These nondisqualifying defects of categories B and C are referred to as "limiting defects."

Separate distributions by physical categories A, B, and C, covering the 1953-1954 period for inductees and voluntary enlistees, indicate that the enlistees have a more favorable per cent distribution than the inductees; *i. e.*, 81:12:7 for enlistees vs. 74:16:10 for inductees in categories A, B, and C, respectively.

A diagnostic distribution of the limiting defects of the inductees in physical categories B and C, obtained for the 1953-1954 period, indicates that these were predominantly eye defects, with refractive errors and defective vision being the most prevalent diagnoses; diseases of the bones and organs of movement, consisting mainly of flatfoot; and psychiatric disorders, primarily psychoneurosis.

Racial differentials were found in both the distribution by physical category and the diagnostic breakdown of the limiting defects.

No comparable diagnostic distribution was available for enlistees. It may be assumed, however, that their limiting defects would in all probability be distributed by diagnosis in essentially the same manner as those of the inductees.

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#### DIABETES AND ISCHAEMIC HEART DISEASE

"At present more than two-thirds of the deaths among diabetics are caused by atherosclerosis, and in 70% of cases ischaemic heart disease is responsible. Moreover, two out of every five diabetics have clinical or electrocardiographic evidence of coronary ischaemia, and a quarter of these are under 40 years of age. The incidence of severe coronary sclerosis among diabetics coming to necropsy is approximately three times the figure for the general population. The frequency of angina is at first sight surprisingly low, until it is realized that more than half the diabetics who develop angina are dead within a year. Finally, the chances of survival after a myocardial infarct are two to three times worse than in a control group. No less than 60% of diabetics die within sixty days of the acute episode, only 16% are alive at the end of five years, and scarcely one survives longer than ten years."

—*British Medical Journal*  
p. 36, July 7, 1956

# HELICOPTER MOBILE MEDICAL COMPANIES

## In the Fleet Marine Force

JOHN E. WING, *Lieutenant, MC, USNR*  
JAMES A. ADDISON, *Commander, MC, USN*

**T**HE Fleet Marine Force (FMF) Medical Service was designed some two decades ago to provide medical support for the amphibious assault, an untested combat concept pioneered by the United States Marine Corps. It received its baptism in the victorious assaults of World War II.

With the detonation of atomic bombs over Hiroshima and Nagasaki and subsequent developments in the family of atomic weapons, the amphibious technic has been the subject of searching re-examination. In the last decade, triphibious assault or vertical envelopment, as a countertactic, has become pre-eminent. It is based on the capability of the transport helicopter to provide tactical mobility, surprise, and dispersion.<sup>1</sup>

To perform the medical mission in triphibious assault, the First Medical Battalion of the First Marine Division instituted experiments in 1955 to revise thinking and planning for future medical support. This revision was necessary after envisioning combat teams with helicopter mobility which would operate over widely dispersed areas and be subject at all times to dissolution into mass casualties. As a facet of this examination, it was decided to test the practicability of mobilization by helicopter of entire medical collecting and clearing companies.

### THE FMF COLLECTING AND CLEARING COMPANY

The medical battalion of a Marine division consists of a headquarters and service company, two 100-bed hospital companies, and three collecting and clearing companies. The latter are unique to the FMF Medical Service. They are responsible not only for collecting and sorting casualties from battalion aid stations in the regimental zone of action, but also for performing emergency lifesaving surgery in their 60-bed hospitals.

The table of organization of a collecting and clearing company is shown in figure 1. For conventional amphibious operations,

from First Medical Battalion, First Marine Division, FMF, Camp Pendleton, Calif.

it is staffed by 4 Navy medical officers, 70 hospital corpsmen, and 22 marines. Its basic medical equipment weighs 12,763 pounds, in addition to the 10-day initial resupply block weighing over 3 tons. It is provided with 1 surgical trailer, 3 utility vehicles, 5 field ambulances, and 3 jeep ambulances.

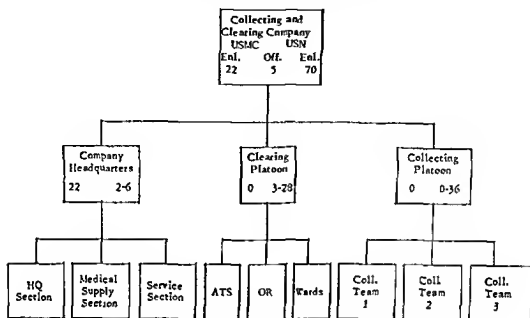


Figure 1. Table of organization of Fleet Marine Force collecting and clearing company.

In the fluid situation of highly mobile triphibious warfare, medical elements operating in support of ground combat teams must possess flexibility of organization, the capacity to incorporate needed additional support elements (shock teams; surgical teams; atomic, biologic, chemical warfare defense and decontamination teams; and preventive medicine teams) and the ability to extrude elements capable of semidetached functioning which may be vitally needed elsewhere. The FMF medical collecting and clearing company is such a unit. Medical elements must also possess the ability to respond smoothly and rapidly with attendant medical equipment to swiftly changing tactical situations. In combat involving the use of atomic weapons by both sides, the ability to airlift on an hour's notice to an area possibly denying entrance by surface vehicle but requiring its services is of the highest import.

#### THE TRANSPORT HELICOPTER AND DEPLOYMENT OF MEDICAL COMPANIES

At the time of the Korean campaign, when the concept of vertical envelopment was in its inception, the helicopter demonstrated its value in uses ranging from artillery observations to switching entire battalions on the front line, giving evidence from the first



that it represented a major advance in combat. The medical services of both field forces promptly utilized this work horse for evacuation of casualties from the front lines.

Experiments in heli-lifting medical collecting and clearing companies were performed with the admittedly inadequate Sikorsky transport helicopters (HRS) 1 and 3. The limitations imposed on a medical company evolved around the lift capability of this interim transport helicopter, which was from 700 to 1,000 pounds over and above its two-man crew and fuel. Factors such as the temperature of the air, the height above sea level, the level of fuel remaining, the length of flight time, and the condition of the helicopter all entered into any computation of the payload.

Only equipment falling within the lift capability of the HRS as to weight, size, and density could be considered, eliminating all vehicles, 9-kv generators, and shower units. Of the equipment thus eliminated, only the 9-kv generator was critically needed for functioning of the clearing platoon. Substitution of the presently used generators by smaller ones weighing about 250 pounds and capable of providing current for operating-room illumination, suction, and refrigeration would have made it possible to heli-lift the necessary equipment.

Flexible lift priorities for men and equipment were established so that admission, triage, and shock-team equipment and personnel could be functional while other elements were being shuttled in. Equipment loads were prepalletized and arranged so that helicopters could load either internally (fig. 2) or for external lift (fig. 3).

In the first pilot exercise, the assigned medical company minus its 10-day supply block and its vehicles was airlifted by 6 HRS-1 type helicopters provided by Marine Helicopter Transport Squadron 363 (HMR-363), El Toro, Calif., to a site 6 air miles away within 1 hour and 31 minutes from initiation of flight to termination. Forty-five helicopter lifts were required for this particular exercise. Within one hour after the lifting of first priority equipment and personnel, the admission, triage, and shock team was functional. The operating-room team was functional within 2½ hours after the lift commenced; ward teams, within 3 hours; and galley equipment for feeding patients, within 3½ hours.

In a similar exercise in a tactical desert situation at Marine Corps Training Center, 29 Palms, Calif., an entire medical collecting and clearing company complete to its 10-day resupply block but minus its vehicles, was heli-lifted 10 air miles by 6 helicopters of the HRS-3 type (HMR-362) and was functional within 3 hours.



*Figure 2. Hospital corpsmen loading field autoclave aboard HRS helicopter.*



*Figure 3. HRS-3 (H-19) hovering prior to the external lifting of medical equipment of a collecting and clearing company being heli-lifted forward.*

The medical company, resupplied by helicopter, is potentially capable of receiving casualties from surface vehicles in the area or brought in by reconnaissance helicopters, and of evacuating via transport helicopters the casualties within its zone of action who require further treatment.

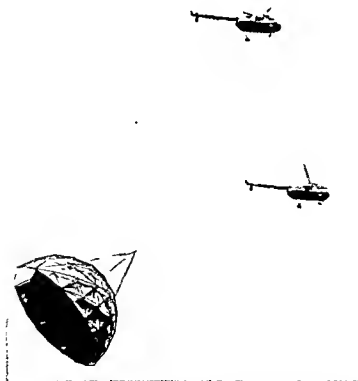
Concomitant with the development of larger helicopters, studies are underway aimed at lightening medical equipment and decreasing the time required for establishing medical functions. The recent report of Storer and Krebs<sup>2</sup> on the development of radiothulium portable x-ray equipment for use in field hospitals is an example of this effort. The adaptation of the lightweight "Mity-Mite" and "Mule" as ambulances will further increase the potentiality for total heli-lift of medical units (figs. 4 and 5).



Figure 4. Marine HRS helicopter lifting "Mity-Mite." This light-weight vehicle can be converted into an ambulance.



*Figure 5. Hospital corpsmen evacuating casualty from front line to battalion aid station in the "Mule," lightweight vehicle.*



*Figure 6. A 42-foot diameter geodesic dome being transported by two HRS type helicopters. This shelter can, with modifications, serve as triage or operative area.*

Evaluation has been made within this battalion of adapting preassembled geodesic domes, which can be lifted by two HRS type helicopters (fig. 6), to use as triage, ward, and surgical areas in place of field tents. Continuing experiment along these lines, to adapt medical organizations to developing helicopter mobility, may result in potentially useful techniques.

### SUMMARY

A Fleet Marine Force medical collecting and clearing company has been expeditiously moved by the presently used helicopter (HRS). The helicopter is visualized not only as a rapid means of casualty evacuation, but also under certain tactical situations as an essential agent for increasing the mobility of medical units.

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### THE PROBLEM OF NUCLEAR INDUSTRY

"Radioactive wastes from reactors must be segregated or diluted to tolerable concentrations. At present, underground storage and ocean burial are among the methods used or proposed for segregation. Both the economy and the adequacy of these methods are under continuing investigation in anticipation of the probable increase in volume of radioactive wastes.

"It is estimated that nuclear power plants completed during 1964 alone will have a power level exceeding  $2.25 \times 10^4$  kilowatts, producing wastes each year of  $3.3 \times 10^{14}$  gallons containing 10 millicuries per gallon. An indication of the magnitude of this activity is that the entire flow of the Mississippi River would not be sufficient to dilute to permissible concentrations the fission products from these plants. Such a method of dilution, of course, is obviously least likely to be used.

—Public Health Reports  
p. 611, June 1956



the anterior abdominal wall, or air in the region of the right kidney.<sup>2</sup>

**Treatment.** Immediate diagnosis and surgical intervention is imperative for such a condition. After attempts at correcting shock and electrolyte deficiency, if present, laparotomy should be performed. Retroperitoneal ruptures can easily be overlooked, even with mobilization of the entire duodenum, and should therefore be searched for. Following closure of a retroperitoneal rupture, retroperitoneal drainage should be afforded.

Supportive postoperative therapy in the form of replacement electrolytes, whole blood transfusions when necessary, and antibiotics will decrease the heretofore high mortality of duodenal rupture.

**Mortality.** The mortality rate has progressively improved. In 1910, Gulbê<sup>3</sup> reported a 90 per cent mortality in 134 cases. In 1940, Hinton<sup>4</sup> reported a 45 per cent mortality in 84 cases. In 1949, Siler<sup>2</sup> reported a 20 per cent mortality in 25 cases. Since then there have been isolated cases reported with no mortalities. Certainly with prompt diagnosis and immediate reparative surgery, the mortality in this type of injury can be kept to a minimum.

#### SUMMARY

Traumatic rupture of the duodenum is a fairly uncommon but well-known entity. The case presented is unique in two aspects: (1) It is believed to be the first reported of complete transverse division of the duodenum caused by nonpenetrating trauma; and (2) the patient is believed to be the youngest reported in the literature, to have been treated successfully for traumatic rupture of the duodenum.

The most common site of rupture is in the relatively fixed portions of the duodenum. Signs and symptoms depend on whether the rupture is into the peritoneal cavity or into the retroperitoneal space. If the rupture is intraperitoneal, the signs and symptoms are those of acute peritonitis. A retroperitoneal rupture may produce a less stormy course with varying degrees of pain, fever, and leukocytosis.

Prompt diagnosis, correction of shock and electrolyte imbalance, and early surgical repair of the rupture will decrease the high mortality of this condition.

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# Pituitary Ependymoma

SARKIS S. SARKISIAN, *Commander, MC, USN*  
ARTHUR L. SCHULTZ, *Captain, MC, USN*

**E**PENDYMOMA of the pituitary gland is not generally recognized as a primary lesion and a case is presented below which is considered by us to be a primary ependymoma of the pituitary gland. According to Kernohan and Sayre,<sup>1</sup> intracranial ependymomas are the second most common type of gliomas, occurring on an average between 23 and 24 years of age. In their series, 40 per cent of the ependymal tumors were located supratentorially and 60 per cent infratentorially. Of the latter, 90 per cent occurred in the midline and involved the fourth ventricle or cisterna magna. Antoni<sup>2</sup> proposed that gliomas of the pituitary can arise as ependymomas from the neurohypophysis and stalk. All tumors in this region, then, are not of primary pituitary gland derivation. In fact, Antoni believed that the preponderance of these tumors are ependymal gliomas. Although, anatomically, ependymal lining cells dip into the infundibulum of the pituitary, as illustrated in figure 1, and can conceivably give rise to an ependymoma, there is a remarkable absence of such cases documented in the literature. The question of how often ependymomas of the pituitary occur can be elucidated to some degree by re-examination of tumors of this area and correlation with other applicable information, such as case history and operative or autopsy findings. An organization such as the Armed Forces Institute of Pathology might have material available for such a study.

## CASE REPORT

The patient was a 31-year-old woman who after a normal pregnancy three years earlier had had amenorrhea and intermittent lactorrhea. Eight months prior to admission she observed blurred and hazy vision in the left eye associated with photophobia. Two months prior to admission she noted that she was almost blind in the left eye.

The physical examination was negative except for visual field studies which revealed a marked restriction of the visual fields on the left side compatible with the pattern of a bitemporal hemianopsia. The impression was primary optic atrophy due to a chiasmal tumor. Roentgenograms of the skull revealed the pituitary fossa to be enlarged with erosion



of the posterior clinoid processes. These findings were considered to be suggestive of local pressure effect compatible with a pituitary tumor.



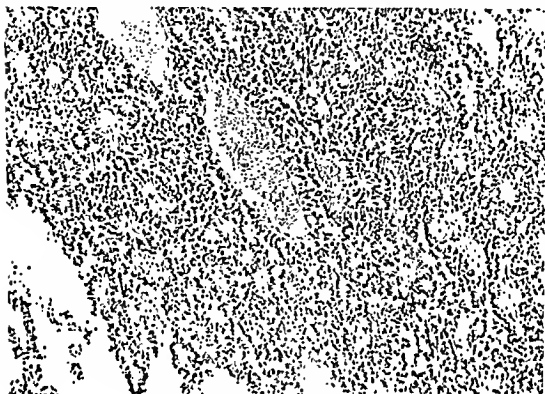
*Figure 1. Midline hemisection of a brain specimen, with pointer demonstrating ependymal reflection into pituitary stalk.*

On craniotomy a tumor mass was found to have compressed the left optic nerve. The tumor—gray-brown in color, soft, and friable—appeared to be arising from the pituitary gland, and much of the mass was removed. At this time, it was considered to be a chromophobe adenoma. The patient made an uneventful recovery with good visual improvement of the left eye.

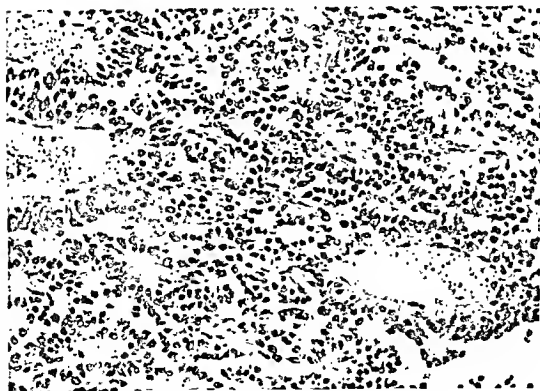
#### DISCUSSION

It is evident that, although anatomically likely, ependymomas of the pituitary gland are infrequently documented.<sup>1-5</sup> In such a case of intracranial neoplasm certain pathophysiologic conditions may be expected due to local mechanical pressure on the optic nerve and pituitary gland. Thus, in the case which is presented above, there are the usual changes associated with hypopituitarism, such as amenorrhea.

The microscopic findings in the tumor (figs. 2 and 3) reveal a characteristic histologic appearance of an ependymoma, consisting of spinal cells with abundant cytoplasm arranged in rosettes and pseudorosettes and radially around vascular channels.



*Figure 2. Low-power view of pituitary tumor. ( $\times 100$ )*



*Figure 3. High-power view of pituitary tumor, revealing characteristics of an ependymoma. ( $\times 240$ )*

It would appear that not only are pituitary ependymomas to be expected from an anatomic standpoint but that they also exist clinically.

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#### HYPOTENSION FROM RAUWOLFIA DURING ANESTHESIA

\*Hypertensive surgical patients on Rauwolfia therapy have shown significant hypotension and bradycardia during anesthesia. . . . This appears to be a vagal response enhanced by the vagoronic anesthetics and corrected by the use of vagal blocking drugs.

\*Patients on Rauwolfia therapy who are to undergo elective surgery should not receive this drug for two weeks prior to the surgical procedure. The hazards of removing the antihypertensive and tranquilizing effects of these drugs must be considered before discontinuing therapy prior to a surgical procedure. Emergency surgery on these patients may be safely carried out by using vagal blocking drugs to prevent and treat vagal circulatory responses.

—CHARLES S. COAKLEY, M. D.

SEYMOUR ALPERT, M. D.

JOHN S. BOLING, M. D.

in *The Journal of the American Medical Association*, p. 1144, July 1956

# Levarterenol in Cardiac Infarction

## With Shock and Transient Complete Heart Block

ARCHIBALD L. RUPRECHT, *Lieutenant, MC, USNR*

**I**NFARCTS of the heart causing A-V dissociation are often fatal. Reported here is a case of total block that lasted a week after infarction; during this period, adequate blood pressure was maintained only with the help of Levophed Bitartrate (brand of levaterenol bitartrate). The patient recovered, however, and even a year later cardiac symptoms were no more severe than prior to the attack. Now that hypotension and slow ventricular rates are more easily treated,<sup>1,2</sup> the prognosis in such cases may be better, many deaths being from the cumulative effect of several factors. Cardiac output declines as a result of the infarct, but is apt to drop lower with onset of bradycardia so that hypotension is often severe.<sup>3,4</sup> If fever develops and greater minute output is called for, fixation of rate can be a separate handicap. Ischemia of the myocardium may become so marked as to impair function and favor more dire changes in rhythm.<sup>5</sup> As the following case suggests, this sequence need not occur regularly, and the often transient nature of the block should emphasize the opportunity for therapy.

### CASE REPORT

A 54-year-old white male nurse was admitted to the hospital in May 1954 because of substernal pain of 30 hours' duration, associated with nausea and a single emesis. He had had angina pectoris and mild hypertension for 5 years, with an average blood pressure of 170/90 mm Hg. The only other cardiac symptom was dyspnea on moderate exertion, present for 18 months.

On hospital entry, blood pressure was 128/78 mm Hg; heart rate, 82; respirations, 20; and oral temperature, 97.8°F. No signs of congestive failure were present. The heart was not enlarged to percussion, sounds were of good quality, and the rhythm was regular; a soft systolic murmur was heard just to the right of the manubrium, but the second sound was louder here than at the pulmonic region. Except for mild obesity, there were no other pertinent physical findings.

Examination of the blood revealed a normal value for hemoglobin and a slight leukocytosis, a high percentage of neutrophils being the sole abnormality on smear. The urine was not remarkable. A serum test for syphilis was negative. An electrocardiogram a few hours after entry showed a sinus bradycardia of 50 and changes indicative of a fresh posterolateral infarct with a septal component. The key features were a deep Q wave and S-T segment elevation in lead III; the only notable finding in lead II was a diphasic T wave. In addition, S-T segments were high in leads aVR, aVF, and V<sub>1</sub>, but low in leads I, aVL, and V<sub>4</sub> through V<sub>6</sub>, the depression being accompanied by T-wave inversion. Position of the heart was intermediate with moderate counterclockwise rotation. P-R and QRS intervals were of normal length, and though all ventricular complexes were slurred, evidence of left ventricular hypertrophy was lacking. A roentgenogram of the chest was not made at this time.

Strict bed test and oxygen by nasal catheter were provided. Daily doses of phenobarbital were begun and also small doses of morphine as needed to relieve substernal pain. The patient's temperature rose 8 hours after admission to 101.6°F, the start of a marked febrile response that was to last nearly a week. Apart from chest pain and fever, however, the man's course during the first hospital day was uneventful.

The quality of the heart sounds deteriorated by the next morning, and toward midday the pulse rate was regularly around 55. An electrocardiogram at this time showed only typical changes of posterolateral infarction and complete A-V block. The form of the QRS complex was unchanged, indicating a nodal rhythm. The blood pressure began to fall faster and late that afternoon reached 94/60 mm Hg, the patient exhibiting signs of circulatory collapse: anxiety, pallor, and a cold sweat. Fine rales became audible over the lung bases, but other evidence of congestive failure did not develop.

The patient was in this critical state for almost 2 hours before an infusion was started containing 4 mg of Levophed Bitartrate per liter of 5 per cent dextrose in water. Administered at a rate of 20 drops a minute, this restored the patient to preshock status within half an hour. Penicillin was given as prophylaxis, oxygen by tent substituted for the nasal catheter, and in view of a bad prognosis, heparin sodium and Dicumarol (brand of bishydroxycoumarin) were begun.

The rate of flow of Levophed Bitartrate was adjusted to keep blood pressure at about 120/80 mm Hg. A pericardial rub was audible 36 hours after admission and persisted until the next afternoon, the day when some stability in the patient's condition became apparent. Chest pain was milder and less frequent, and in spite of the disposing factors, frank congestive failure was not present. Re-examination of the patient and a second urinalysis failed to disclose an infectious cause for the sustained fever. Penicillin was replaced by a broad-spectrum antibiotic, but the high temperature did not abate.

Late in the third day, the patient complained again of severe substernal pain when the pressor infusion stopped because a clot formed in the needle. There was ashen pallor, and blood pressure was 90/60 mm Hg, changes which proved quickly reversible when Levophed Bitartrate was restarted. This sequence was repeated the next night, and to avoid other similar episodes, a plastic catheter was inserted in an ankle vein. In the process, resumption of this therapy was delayed about two hours, and by then cardiac shock was more advanced. Blood pressure was not recorded lower than 90/60 mm Hg, but the patient was very restless and in a profuse sweat with blotchy cyanosis. Luckily, this deterioration was as easily halted as before.

These bouts of hypotension with each hiatus in therapy are graphed in figure 1. Premature beats were noted at these times, but serial electrocardiograms did not reveal extension of the infarct, showing only evolutionary changes and persistent complete block. The atrial rate was always about twice the ventricular rate of near 50, the form of the QRS complex remaining unchanged.

From the sixth day onward, the patient's course was more favorable as blood pressure was sustained with less Levophed Bitartrate, and both fever and chest pain subsided. Oxygen was continued, however, because the patient became slightly cyanotic if out of the tent for more than a few minutes. Further need for pressor infusion was tested now and then by reducing its rate of flow, the result always being a disturbing drop in blood pressure. The importance of this was substantiated on the eighth day when the patient, in a confused state probably due to barbiturate toxicity, pulled out the venous catheter. Though the full picture of shock did not follow, a marked pallor developed and blood pressure fell to the lowest level in three days (fig. 1). Rational behavior slowly returned once phenobarbital was withheld, and additional Levophed Bitartrate corrected the hypotension.

Eighteen hours after this episode, the ventricular rate rose spontaneously to between 80 and 90, this being the return of A-V conduction after a complete block. The P-R interval was prolonged for a time, but the venous circulation was over and Levophed Bitartrate was stopped with difficulty, blood pressure stabilizing at 115/80 mm Hg. A total of 52 mg of Levophed Bitartrate had been given, and despite typical problems with its administration, there was no trouble from vasospasm near the sites of infusion. With improvement in cardiac function, antibiotic and oxygen therapy was also discontinued.

After three weeks, no abnormalities of the heart could be detected on physical examination, and a chest radiograph showed cardiac and aortic shadows of normal size and contour. Ambulation was begun and Dicumarol discontinued.

At the end of four weeks the patient left the hospital to begin a prolonged rest at home. A year later, he reported the return of mild hypertension and persistent angina, but congestive failure had not

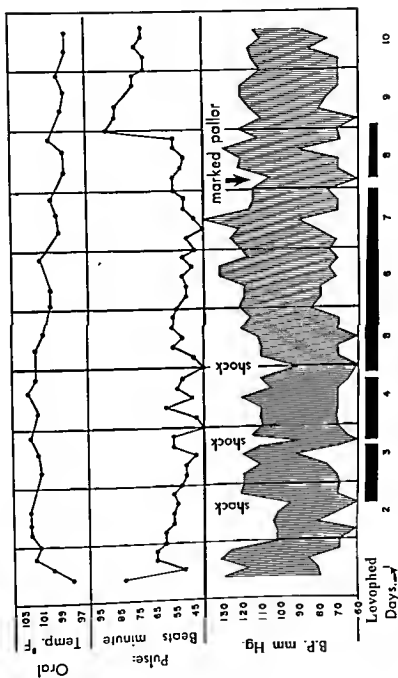


Figure 1. Graph of patient's clinical course showing inability to maintain an adequate blood pressure without Levophed Bitartrate during period of complete A-V block.

nor was there a history of peripheral embolus. He was working full time as a hospital nurse and described his physical limitations as very similar to what they were prior to infarction.

*Comment.* The crucial role of pressor therapy in the recovery of this patient seems clear. Blood pressure fell rapidly after onset of complete block, and only with Levophed Bitartrate was an adequate level maintained until A-V conduction returned a week later. Hypotension was never marked, but surely cardiac shock existed in view of the clinical picture and the previously high blood pressure. Only at times of circulatory collapse was irregularity of the heart noted, but in cases like this, ectopic beats are often numerous or herald a fatal arrhythmia if hypoxia is not relieved.

Despite the prolonged need for adjuvants, disability seemed the same after recovery, suggesting that much of the acute trouble was related to block. At that time the myocardium was ischemic from hypotension and less able to compensate for the infarcted and inert zone. In turn, low blood pressure was due to decreased systolic power and a slow, as well as fixed, ventricular rate. During the high fever, this rate was no greater than on the seventh and eighth days when the temperature was almost normal and less was demanded of the heart (fig. 1). Fixation of rate was thus an extra factor to limit output at a time when the best possible coronary flow was desirable; although impaired by both the old and fresh cardiac lesions, the stroke volume was being heavily relied on to sustain the circulation. In spite of mild congestive failure, better coronary flow as a result of the rise in blood pressure was enough to restore adequate ventricular function and permit recovery. The effect of Levophed Bitartrate in contracting the peripheral vascular bed probably made this easier. In the patient's favor were the anginal history and high location of the pacemaker, but these features do not detract from this example of the help a pressor agent can be at times.

#### DISCUSSION

A statistical study alone can show if persons like this patient derive unusual benefit from pressor therapy. Though such benefits have been suspected by other authors, their comment has been brief.<sup>6</sup> This analysis is offered because a large series is hard to collect, yet cases are common enough to make the point of interest. Many articles report the value of Levophed Bitartrate in shock from a cardiac infarct, and the basis for a better prognosis in this material as a whole is granted.<sup>6</sup> Thus, attention is drawn only to patients in whom shock and A-V dissociation occur together and to the unique features they present.

Infarcts causing total block are often associated with a very low output, cardiac indexes of 1 and less being on record.<sup>4</sup> Gen-



erally, so small a value is expected only after a massive infarct or when there is diffuse fibrosis before the attack, cases where the prognosis correlates with the muscular deficit. When bradycardia contributes to the low minute output, however, damage need not be so severe and return of quite good cardiac function is possible. Regardless of stroke capacity, the combination of fresh infarct and slow rate is apt to cause a decline in minute output due just to the vicious effect of ischemia on contractile force.<sup>7</sup> Though pressor therapy alone will not always be as helpful as in this case, these are patients in whom timely preservation of coronary flow can result in striking recovery.

There are other dynamics which should be considered. Diastolic size of the heart may increase with bradycardia, and if there is dilatation initially, fibers can be so stretched that the force of contraction suffers. Also, when hypervolemia exists, the same drop in minute output is a bigger detriment to the circulation than if blood volume is normal, and output can be low indeed when infarction and total block occur together. Further, when atria and ventricles beat out of phase, ventricular blood is now and then ejected past partly open membranous valves back into the venous trunks.<sup>8</sup> Such features reveal how important good coronary flow is to these persons so that avoidable ischemia will not make systole any less effective. Pressor therapy keeps to a minimum the weakness that stems from prior cardiac lesions, at a time when full systolic power may be sorely needed.

Of great interest are aspects of the change in rhythm itself. Total block may appear at the time of infarction or not for a day or more. As the region of the A-V node is protected from infarction by a rich anastomosis, this arrhythmia is usually attributed to hypoxia of that zone,<sup>9</sup> any delay being for ischemia or oxygen unsaturation of the blood to reach a critical level. This is perhaps the rule when block follows an anterior infarct, but if the lesion is posterior, as is usual, conducting tissue can also be caught in the necrosis or the reaction it excites. Onset and duration of block possibly vary on that basis. Inflammation is probably just a minor factor, viable muscle about an infarct having a marginal blood supply that accounts for extension. Extension is more likely if ischemia is aggravated by a marked fall in blood pressure, the very picture infarcts with dissociation are apt to present. It is all the more important to avoid extension in these cases lest block be permanent as a result. Prompt use of Levophed Bitartrate may spare some of these persons this lasting handicap or abolish the arrhythmia and simplify recovery; reports of the latter are already in the literature.<sup>6</sup> With no other group of myocardial infarcts does pressor therapy have this role.

Fixation of ventricular rate is also a problem at times. Complete block is often thought to imply a fixed rate, but Gilchrist's<sup>10</sup>

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study of A-V dissociation showed true fixation to be unusual. Regardless of cause, he found a rise of four beats per minute with each degree of fever and a wide range of response to exertion, some persons showing an increase of 50 per cent but others none. That even fever may fail to cause acceleration is seen in figure 1. These differences are probably related to location of the pacemaker and to variable nervous factors, but pertinent here is that fixation occurs. If stroke volume is close to capacity and there is inability to increase heart rate, a febrile illness will challenge the circulation.

When there is fever and need for copious systemic perfusion, limited cardiac output can result in hypotension and a drop in coronary flow. How big a problem total block may be even without pyrexia is shown by the hypometabolism to which chronic cases are prone.<sup>11,12</sup> The febrile response to an infarct is seldom as marked as graphed here, but serious heart disease is often complicated by infection. Whatever the cause, fever combined with a fixed ventricular rate is a grave threat to persons whose stroke capacity is low. In sustaining pressure by a contraction of the vascular bed, Levophed Bitartrate is especially helpful in such patients, this case being an example.

Even with other adjuvants, pressor therapy is unable to meet the circulatory crises sometimes presented, and then an attempt is made to raise ventricular rate. In years past, ephedrine or epinephrine was usually tried, but use of either entails added risk of ventricular fibrillation and better agents are now available. For this purpose, isopropylarterenol hydrochloride (Isuprel Hydrochloride) and sodium lactate are safer and, judging from a variety of reports,<sup>1,11,14</sup> often very effective. These new agents are helpful too in abolishing ectopic foci when, though blood pressure is normal, ventricular speed is so slow as to lead to hypoxic irritability of heart muscle. Quinidine sulfate is unsafe if there is heart block. With bradycardia easier to manage, more chances to treat these cases successfully are likely.

Besides sustaining blood pressure when cardiac output is so limited, effective pressor therapy assures the better perfusion of heart muscle that bradycardia makes possible. During systole, blood vessels in the myocardium are compressed, tachycardia leading to heart failure if diastole becomes too brief for the muscle to be nourished.<sup>15</sup> As a rule, this is seen only with quite rapid rates, but each contraction makes some foci ischemic, those near the endocardium being susceptible to necrosis because they are close to cavity pressure.<sup>16,17</sup> Also, even moderate tachycardia seems important to avoid if atherosclerosis limits coronary inflow or a fresh thrombus blocks a major conduit.<sup>18</sup> If aortic pressure can be kept normal, a slow ventricular rate may allow unusually good perfusion of muscle and the handicap may be turned to advantage. Though hard to prove, this is also suggested by an experiment

showing coronary flow to rise as heart rate falls and greater increments to occur as speeds approach those typical of A-V dissociation.<sup>19</sup> Support is found too in the recent report that angina often disappears with the advent of complete block.<sup>20</sup>

Only a study of many cases can test such concepts and show if these patients derive special benefit from pressor therapy. Notable, however, is a paper by Binder and associates<sup>6</sup> on Levophed Bitartrate in shock after cardiac infarction, the most striking results being in a small group with total block. The poor outlook for those persons is usually blamed on the diffuse coronary atherosclerosis often present,<sup>9</sup> but emphasis on this alone is arbitrary as there seems to be no clinicopathologic review of a large series. As these cases are uncommon, it is hoped this analysis will lead to pooling of experience and more awareness of what therapy offers the occasional patient.

### SUMMARY

Infarcts of the heart that lead to complete A-V block are often fatal, yet the high mortality is in part related to the change in rhythm which may be temporary. If coronary flow were sustained during this crucial phase, more of these persons might survive and regain their cardiac function. Vasopressor therapy probably has special value in this situation, as illustrated by the case reported herein. As safe agents are available for raising ventricular rate, there is added reason to recognize the opportunity for treatment that these patients present.

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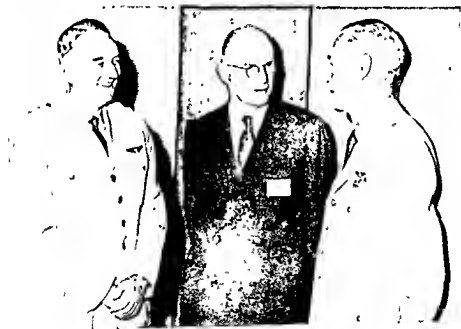
## NOT VITAMINS ALONE

"Many patients in a hospital for chronic diseases had been taking large doses of brewer's yeast over long periods of time—months and years. The utter inadequacy of this therapeutic approach was quickly revealed by a mere glance at the large number of cachectic persons in this group. In other words, vitamins per se, or any other preparation designed to stimulate eating, are totally ineffective without provision of a diet containing sufficient calories. We believe that the treatment for undernutrition is a good diet, not vitamin supplements."

—JOSEPH I. GOODMAN, M. D., and  
WILLIAM DOWDELL, M. D.  
in *Annals of Internal Medicine*  
p. 1256, Dec. 1955

### DOCTOR BERRY AND GENERAL OGLE VISIT NEW HOSPITAL

Doctor Frank B. Berry, Assistant Secretary of Defense (Health and Medical), accompanied by Major General Dan C. Ogle, The Surgeon General, Department of the Air Force, visited Brigadier General Edward J. Tracy, the Surgeon, Headquarters Air Materiel Command, USAF, at Wright-Patterson Air Force Base, Ohio, on the occasion of the opening of the new U. S. Air Force Hospital at that base.



The new Air Force area hospital, dedicated at Wright-Patterson on 21 September 1956, has facilities for 300 authorized operating beds, with a potential expansion to 426 beds in an emergency or under mobilization circumstances. Complete medical, surgical, and dental care is furnished to military personnel stationed in the Ohio area. This new modern medical facility is the sixth largest of the Air Force hospitals.

## A MESSAGE FROM THE A. M. A.

This past year our monthly "Messages" in this *Journal*, with the exception of the one in the October issue, have been devoted to the varied activities and services offered by the American Medical Association. The first article in the series pointed out that the Association has as its objective the promotion of the science and art of medicine and the betterment of public health. It is a physician's organization existing to serve the physician and the general public.

The major emphasis of the American Medical Association is upon its scientific activities. As the last message of this year, it is most appropriate to discuss the purpose and activities of the Council on Scientific Assembly and the Bureau of Exhibits of the Association.

The Scientific Program at the Annual Meeting of the American Medical Association is the culmination of more than one hundred years' experience in program building. Beginning in 1847, there was a gradual increase in the scope and importance of activities at annual meetings until 1915, when the Council on Scientific Assembly was organized by the House of Delegates to correlate the work of the various sections and to stimulate better programs. Meanwhile, in 1899, the Scientific Exhibit had been organized under a separate committee of the House of Delegates. In 1921, the Board of Trustees took over the Scientific Exhibit and administered it under a committee of three members of the Board. This situation of two program committees competing for the attention of the same audience continued until 1953, when the Council on Scientific Assembly was transferred to the Board of Trustees and combined with the Committee on Scientific Exhibit.

The character of medical meetings has changed markedly even during the last half century. At the meeting of the American Medical Association in Denver in 1898, the year before the Scientific Exhibit was initiated, there were 615 papers listed on the program. These were read by "essayists," few of whom had co-authors. At the last meeting of the Association in Chicago in 1956, with a greatly increased attendance over the 1898 meeting and an increase in the various Sections, the number of "papers" had been reduced to 244, nearly half of which were authored by

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From the Council on National Defense of the American Medical Association. The views and opinions expressed are not necessarily those of the Department of Defense.  
—Editor

two to five persons working in collaboration. Other features of the meeting included more than thirty panels and symposiums on various subjects, over three hundred scientific exhibits covering all phases of medicine, four full days of color television, which brought the operating room directly into the meeting hall, and a spectacular group of motion pictures, many of which were explained by the authors as the pictures were shown on the screen. The spoken word is still necessary to convey information, but medical audiences prefer to be talked "with," rather than talked "at," and to look rather than merely to listen.

More than fifty persons are responsible for different portions of the program for the Annual Meeting, including the Section Secretaries, the Section Representatives to the Scientific Exhibit, and chairmen of various special committees for different activities such as the special exhibit on fractures. All of these report to the Council on Scientific Assembly, which acts as a clearing house to eliminate duplications and conflicts and to co-ordinate all activities into a smooth-working whole.

The Clinical Meeting of the American Medical Association, which was started in 1948, is intended to supplement the Annual Meeting by going to cities that cannot accommodate large crowds. Interest has been increasing in the Clinical Meeting, and many physicians find the program more interesting than the Annual Meeting because of the intimate character of the presentations. There is a full schedule of lectures, round tables, panels, scientific exhibits, color television, and motion pictures, but the Sections do not meet. The program is arranged with the co-operation of a local committee in the city where the meeting is held.

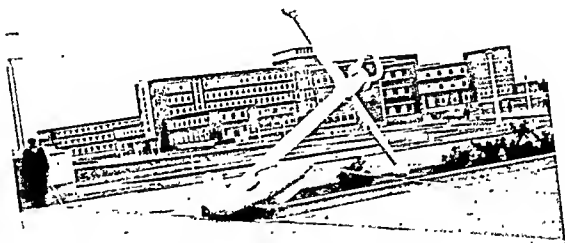
The Bureau of Exhibits, established in 1930, prepares and presents exhibits that depict activities of the various departments of the American Medical Association. The work is carried on in co-operation with the different councils, bureaus, and committees. It furthers both graduate medical education and public health education by graphically presenting scientific and health materials.

Medical exhibits for professional audiences are shown at meetings of state and county medical societies and gatherings of other medical groups and scientific organizations such as dentistry, pharmacy, and veterinary medicine.

Health exhibits for the public are presented at state and county fairs and other public gatherings. Receptive audiences are found at health fairs and expositions as well as at the occasional World's Fair. Museums, both the health museum as found in Cleveland or Dallas and the Museum of Science and Industry in Chicago, reach millions of people who are in a receptive mood for health education.

## MEDICAL SERVICE OFFICERS DECORATED BY REPUBLIC OF PERU

At ceremonies dedicating the new Naval Medical Center of Peru on 4 July 1956 at Lima, Peru, Captain Harry C. Oard, MC, USN, and Lieutenant Commander Charles R. Wannamacher, MSC, USN, were awarded the Peruvian Naval Cross for Merit in the grade of Knight Commander—distinguished as White.



The citations, signed by Rear Admiral Alfredo Sousa Almandoz, Secretary of the Navy of Peru, stated that Captain Oard "as advisor to the Medical Department has given exceptional service to the Peruvian Navy. In the pursuit of his duties, at first as Chief and later as Surgeon General of the Medical Department of the Peruvian Navy, he has at all times displayed the invaluable attributes of his professional capability, training, and experience, and has worked with particular interest for the good of that department. Likewise, he has contributed by his zeal and devotion to the excellent organization and function of the new Naval Medical Center, of which he is the Commanding Officer . . . . He has contributed greatly to the longstanding ties of sincere friendship and loyal cooperation which happily exist between the Navies of the United States of North America and Peru."

Lieutenant Commander Wannamacher was praised in the citation by Rear Admiral Almandoz "for the magnificent work which he has performed and continues to perform for the better outfitting of the Peruvian



Naval Medical Center." His efforts have "contributed decidedly in enabling the Naval Medical Center of Peru to fulfill, with true efficiency, its mission for the good of the Navy and the health of its personnel."



*Vice Admiral Roque A. Saldías, Secretary of the Navy of Peru, decorating Captain Harry C. Oard, MC, USN, with the Peruvian Naval Cross for Merit.*

Lieutenant Gerrude Oard, NC, USNR, wife of Captain Oard, also was decorated with the Peruvian Naval Cross for Merit in the degree of "Officer"—distinguished as White, for as "instructor and advisor in the Art of Nursing in the Hospital Corps School of the Navy (she) has contributed unusually excellent services to the Peruvian Navy."

Among other distinguished guests present at the dedication ceremonies were Rear Admiral Bartholomew W. Hogan, MC, USN, Surgeon General of the United States Navy; Rear Admiral Charles W. Wilkins, USN, Director of Pan-American Affairs, Naval Missions and Advisory Groups Division, Office of the Chief of Naval Operations; Rear Admiral Milton E. Miles, USN, Commandant of the Third Naval District; and Rear Admiral Clarence L. C. Atkeson, USN, Commandant of the Fifteenth Naval District.

The Peruvian Naval Medical Center was built from the plans that were used for the construction of the U. S. Naval Hospital, Beaufort, S. C.



*Lieutenant Commander Charles R. Wannamacher, MSC, USN, receiving the Peruvian Naval Cross for Merit from Vice Admiral Roque A. Saldias.*

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### THE HOSPITAL AND THE DOCTOR

Altruism alone does not prompt a doctor, contemplating establishing a practice, to inquire about the hospital facilities of a community. The hardships and inefficiencies of a house-to-house practice, the long vigil at the bedside of a critically ill patient, and the restrictions that are inevitable through distances and lack of trained personnel have little appeal. It is the district served by a good hospital that attracts the members of our profession.

—KARL HOLLIS, M. D.  
in *Canadian Medical Association Journal*  
p. 774, May 15, 1955

of capillary lesions in patients without this therapy, and the prevention of the hyaluronidase effect in the pericapillary tissues in animals fortified with bioflavonoids. Decidual bleeding in pregnancy and habitual abortion were also greatly reduced by ascorbic acid-bioflavonoid treatment. Finally, a quantitative but nonspecific antiviral effect in poliomyelitis was described as resulting from this combined medication. Although the mechanism of action of this group of compounds was not fully expounded, Szent-Györgyi, in concluding, stated: "Flavonoids represent one of the most exciting, broad, and hopeful fields of biological inquiry."

This compilation of studies cannot be expected to leave the reader with as concise or complete a conclusion as would the work of one author. It is, nevertheless, informative, readable, and possibly even exciting. —ROBERT L. CAVERNAUGH, Lt. Col., MC, USA

**ORAL AND DENTAL DIAGNOSIS** With Suggestions for Treatment, by Kurt H. Thoma, D. M. D., and Hamilton B. G. Robinson, D. D. S., M. S. 4th edition. 449 pages; 928 illustrations; 55 in color. W. B. Saunders Co., Philadelphia, Pa., 1955.

This compact revised edition of a popular dental text has been completely reorganized. Part 1 stresses the responsibilities of the modern dentist if he is to render a health service commensurate with that of today's medicine and surgery. The time and methods of using current examination and laboratory techniques as adjuncts in establishing bedside diagnoses are discussed in detail.

In part 2 specific data are presented on the etiology, histology, pathology, and symptomatology of dento-oral lesions and anomalies. The need for recognition of the normal tissue appearance and the necessity for early treatment planning for the prevention or extension of disease is emphasized.

The systematic format of the new edition has eliminated the need for multiple cross-reference work on the part of the reader. Lesions and abnormalities are considered in relationship to the anatomic areas of their appearance; this follows the logical sequence of the previously prescribed examination procedures. The bibliography is impressive and detailed. References to authors whose works have been considered stimulating should inspire further reading.

The book is generously illustrated. Several of the new color plates are outstanding in quality. A novel feature of the illustrative technique is the depiction of many atypical clinical manifestations of oral disease. This is a marked improvement over the customary stereotyped portrayals of classic pathologic entities.

These authors have produced an effective clinical diagnostic aid for the dental student and a convenient reference volume for the busy general practitioner. —ROBERT L. COOMBS, Lt. Col., USAF (DC)

## New Books Received

Books received by the U. S. Armed Forces Medical Journal are acknowledged in this department. Those of greatest interest will be selected for review in a later issue.

**PSYCHIATRIC RESEARCH REPORTS 1**, of the American Psychiatric Association. Edited by Members of the Committee on Research, 1954-55, *Jacques S. Gottlieb*, M. D., Chairman, *Nathan S. Kline*, M. D., *William T. Lhamon*, M. D., *Albert E. Moll*, M. D., *Harold E. Himwich*, M. D., *George Saslow*, M. D. "Pharmacologic Products Recently Introduced in the Treatment of Psychiatric Disorders." Papers presented at a Regional Research Conference Held Under the Joint Auspices of the American Psychiatric Association and the University of Texas Medical Branch, Galveston, Tex., February 18-19, 1955. General Chairman: *Titus H. Harris*, M. D. Chairman of Scientific Program: *Martin L. Towler*, M. D. Consultant Editor, This Number: *William T. Lhamon*, M. D. Editorial Assistant: *Marion Robinson*, B. S. 152 pages; illustrated. Published by American Psychiatric Association, Washington 6, D. C., July 1955. Price \$2.

**PSYCHIATRIC RESEARCH REPORTS 2**, of the American Psychiatric Association. Edited by Members of the Committee on Research, 1953-54, *Jacques S. Gottlieb*, M. D., Chairman, *Nathan S. Kline*, M. D., *William T. Lhamon*, M. D., *Albert E. Moll*, M. D., *Harold E. Himwich*, M. D., *George Saslow*, M. D. "Approaches to the Study of Human Personality." Papers presented at a Regional Research Conference Held Under the Joint Auspices of the American Psychiatric Association and the Department of Psychiatry of the Graduate School of the National University of Mexico at Facultad de Medicina, Mexico, D. F., March 11-13, 1954. General Chairman: *Alfonso Millan*, M. D. Chairman of Scientific Program: *Rogelio Diaz-Guerrero*, M. D. Consultant Editor, This Number: *Nathan S. Kline*, M. D. Editorial Assistant: *Marion Robinson*, B. S. 176 pages. Published by the American Psychiatric Association, Washington 6, D. C., December 1955. Price \$2.

**SYMPOSIUM ON ATHEROSCLEROSIS**, Held under the Auspices of The Division of Medical Sciences, National Academy of Sciences, National Research Council, at the request of The Human Factors Division, Air Force Directorate of Research and Development, 22-23 March 1954. Publication 338. 249 pages; illustrated. National Academy of Sciences, National Research Council, Washington 25, D. C., 1954. Price \$2.

*Christopher's* **TEXTBOOK OF SURGERY**, edited by *Loyal Davis*, M. D. 6th edition. 1,484 pages; 1,359 illustrations on 716 figures. W. B. Saunders Co., Philadelphia, Pa., 1956.

**PATHOLOGIC PHYSIOLOGY, Mechanisms of Disease**, edited by *William A. Salem*, M. D., F. A. C. P. 23 edition. 963 pages; illustrated. W. B. Saunders Co., Philadelphia, Pa., 1956.

**METHODS AND MATERIALS IN RECREATION LEADERSHIP**, by *Marghelen Vanner*, Ed. D. Illustrated by *William Oxborn*. 288 pages; illustrated. W. B. Saunders Co., Philadelphia, Pa., 1956.

- IMMUNOLOGY AND SEROLOGY**, by *Philip L. Carpenter*. 351 pages; illustrated. W. B. Saunders Co., Philadelphia, Pa., 1956.
- THE VERTEBRATE BODY, A Shorter Version of the Second Edition**, by *Alfred Sherwood Romer*. 486 pages; illustrated. W. B. Saunders Co., Philadelphia, Pa., 1956.
- THE YEAR BOOK OF DRUG THERAPY (1955-1956 Year Book Series)**, edited by *Harry Beckman*, M. D. 560 pages; illustrated. The Year Book Publishers, Inc., Chicago, Ill., 1956. Price \$6.
- HISTORY OF THE SECOND WORLD WAR**, United Kingdom Medical Series. Editor-in-Chief, *Sir Arthur S. MacNalty*, K. C. B., M. D., F. R. C. P., F. R. C. S. **THE ROYAL AIR FORCE MEDICAL SERVICES**, edited by Squadron Leader *S. C. Rexford-Welch*, M. A., M. R. C. S., L. R. C. P., R. A. F. Volume II, *Commands*. 695 pages; 54 plates and 51 maps, diagrams and figures. Published by Her Majesty's Stationery Office, London, E. C. 1, 1955. To be purchased from York House, Kingsway, London, W. C. 2. Price 75s. net (\$13.50).
- SYMPOSIUM ON MYASTHENIA GRAVIS**. Papers read at the First International Conference on Myasthenia Gravis, at Philadelphia, Pa., on December 8-9, 1954, under auspices of The Myasthenia Gravis Foundation, Inc., New York, *Henry R. Viets*, M. O., and *George D. Gammon*, M. D., Guest Editors, 742 pages; illustrated. Distributed by The Myasthenia Gravis Foundation, Inc., New York, N. Y., 1955.
- INTRODUCTION TO HEPATIC SURGERY**, by *Henry Gans*, M. O., with an Introduction by *A. Brunschwig*, M. D. 292 pages; 120 illustrations. Elsevier Press, Inc., Houston, Tex., 1955. Price \$12.
- APPLIED ORTHODONTICS**, by *James David McCoy*, M. S., D. D. S., F. A. C. O., in collaboration with *Earl Emanuel Shepard*, O. D. S., F. A. C. D. 7th edition. 336 pages; 212 illustrations and 9 plates. Lea & Febiger, Philadelphia, Pa., 1956. Price \$7.50.
- ATLAS OF PLASTER CAST TECHNIQUES**, by *E. E. Bleck*, M. D., *Nellie Duckworth*, and *Nancy Hunter*. 128 pages; illustrated. The Year Book Publishers, Inc., Chicago, Ill., 1956. Price \$4.75.
- EPITOME of the Pharmacopeia of the United States and the National Formulary with Comments**. Issued under the Direction and Supervision of the Council on Pharmacy and Chemistry of the American Medical Association. 10th edition. 322 pages. J. B. Lippincott Co., Philadelphia, Pa., 1955. Price \$3.
- BIOCHEMISTRY FOR MEDICAL STUDENTS**, by *William Veale Thorpe*, M. A. (Canab.) Ph. D. (Lond.) 6th edition. 542 pages; 48 illustrations. J. B. Lippincott Co., Philadelphia, Pa., 1956. Price \$6.75.
- DISEASES OF THE LIVER**, edited by *Leon Schiff*, M. O., Ph. D., with the collaboration of 27 contributors. Foreword by *Cecil J. Watson*, M. D., Ph. D. 738 pages; illustrated. J. B. Lippincott Co., Philadelphia, Pa., 1956. Price \$16.
- A GUIDE TO PSYCHIATRIC BOOKS With Some Suggested Reading Lists**, by *Karl A. Menninger*, M. D. 2d revised edition. The Menninger Clinic Monograph Series No. 7. 157 pages. Grune & Stratton, Inc., New York, N. Y., 1956. Price \$4.75.
- PRACTITIONERS' CONFERENCES Held at New York Hospital-Cornell Medical Center. Volume 3**. Edited by *Claude E. Forkner*, M. D., F. A. C. P. 293 pages; illustrated. Appleton-Century-Crofts, Inc., New York, N. Y., 1956. Price \$6.75.



## Monthly Message

The recently authorized Dental Advisory Committee will have held its second meeting by the time this issue of the *Journal* is published. This Committee consists of the Dental Chiefs of the three armed services, three members selected from a group recommended by the American Dental Association—Dr. John C. Brauer, Dr. Daniel F. Lynch, and Dr. Francis J. Reichmann—and Dr. Thomas P. Fox as Chairman. Dr. Fox is the dental member of my Civilian Health and Medical Advisory Council.

This office welcomes the members of this Committee wholeheartedly in their official status. I am sure that they will contribute greatly in helping to solve the troublesome problems concerning personnel, the extent of dental work that should be done for those in the services, dental supplies, a proper program for dependent care, the care of dependents in remote and foreign areas, and other questions that arise from time to time.

The second meeting was continued for two days, the first spent at the Naval Receiving Station, Bainbridge, Md. (a "boot camp"), and the second here in Washington. Through this Committee a far better liaison is established with the American Dental Association than has been possible in the past, and we fully expect that profit will accrue both to the civilian and military groups.

*Frank B. Berry*

FRANK B. BERRY, M. D.  
Assistant Secretary of Defense  
(Health and Medical)

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## Foreword

The *United States Armed Forces Medical Journal* is the medium for disseminating information of administrative and professional interest to all medical personnel of the Department of Defense. The Assistant Secretary of Defense (Health and Medical) and the Surgeons General of the several services invite all medical officers, dental officers, Medical Service Corps officers, Nurse Corps officers, and officers of the Veterinary Corps of the Armed Forces, and the medical consultants of the Army, Navy, and Air Force to submit manuscripts for publication in this journal.

FRANK B. BERRY, M. D.,  
*Assistant Secretary of Defense (Health and Medical)*

MAJOR GENERAL SILAS B. HAYS,  
*Surgeon General, United States Army.*

REAR ADMIRAL BARTHOLOMEW W. HOGAN,  
*Surgeon General, United States Navy.*

MAJOR GENERAL DAN C. OGLE,  
*Surgeon General, United States Air Force.*

# UNITED STATES ARMED FORCES MEDICAL JOURNAL

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## PSYCHOLOGIC CONSIDERATIONS IN ATOMIC WARFARE

ALBERT J. GLASS, *Colonel, MC, USA*

THE trend of world events in the atomic age forces the inevitable conclusion that in future combat military medicine must be prepared to care for mass casualties of a magnitude and abruptness which far exceed any previous experiences in conventional warfare. In planning to meet this challenge, the types and numbers of physical injuries to be expected can be reasonably estimated from the quantities of heat, blast, and radiation that will be unleashed by the atomic explosion. However, the effect of the psychologic trauma accompanying such a destructive weapon in producing mental breakdown or otherwise adversely influencing behavior is not so susceptible of measurement or prediction. Yet the emotional state of the relatively uninjured survivors in atomic attack is of primary consideration, because only by their efforts can there be prompt reorganization for lifesaving aid to and rescue of the seriously injured, or for any effective defense against an immediate enemy assault exploiting such a tactical situation.

### MATERIALS

There has been little or no experience with behavior under conditions of atomic disaster. For this reason the reactions of military and civilian groups who have been subjected to episodes of catastrophic trauma were studied in an effort to ascertain the general characteristics and operational determinants of behavior under severe stress that could be applied to the control of mass psychologic disorders in atomic warfare. Relevant data are available from the following sources.

Combat. Beginning with "shell shock" in World War I<sup>1</sup> and continuing through World War II<sup>2</sup> and Korea,<sup>3</sup> there have been numerous observations and studies of troops exposed to varying degrees and types of battle stress. As a consequence, considerable

<sup>1</sup>From Walter Reed Army Institute of Research, Walter Reed Army Medical Center, Washington, D. C.

knowledge has accumulated relative to the circumstances in combat that are most favorable for the occurrence of psychologic breakdown, now termed combat fatigue or combat exhaustion.

**Aerial Bombardment.** Information is available relative to behavioral reactions during and after air strikes against population centers. These data, almost entirely derived from the psychologic impact of bombing raids on Germany, England, and Japan during World War II, have been summarized by Janis.<sup>4</sup>

**Civil Disaster.** Field investigations have been made of unforeseen or spontaneously occurring civil disasters such as fires, explosions, hurricanes, tornadoes, and floods. In 1952 the National Research Council<sup>5</sup> established a Committee on Disaster Studies which has functioned as a clearinghouse for the dissemination of field research data obtained from recent civil disasters and which has stimulated investigation in this sphere. As a result of these efforts, a better understanding of behavioral patterns in severe stress based on time and space considerations has emerged.<sup>6,7</sup>

**Hiroshima and Nagasaki.** There are only a few reported observations of behavior from these two experiences of actual atomic warfare.<sup>8,9-10</sup> Nevertheless they are of special importance for our purposes because they afford an opportunity to compare psychologic reactions due to atomic attack with behavior in other major traumatic situations.

## PANIC

From the foregoing source material, certain generalizations regarding behavior can be made, because they have been consistently noted in most situations of severe trauma irrespective of their cause or of the culture of the group involved. The first general conclusion concerns the phenomenon of panic, usually defined as uncontrolled flight or frantic, purposeless activity. It has been repeatedly observed that instances of mass panic are relatively rare in disaster situations<sup>4,11,12</sup> and mainly occur under special circumstances which involve the element of partial entrapment. Favorable conditions for mass panic are established when persons are faced with an immediate threat of destruction, actual or perceived as such, in a situation where there is either a rapidly narrowing or a limited escape route but one believed to be open to safety. Under these conditions, there is precipitous flight to avoid danger. But when the escape route becomes blocked, frantic, irrational activity frequently results. Such panic behavior quickly becomes widespread, persons involved are pushed and trampled on, and rational thought disappears. None of the foregoing statements should be taken to indicate that precipitous flight to avoid imminent destruction is in itself panic behavior so

long as such activity is controlled or directed away from danger. Indeed, instantaneous flight may be the best possible adaptation for survival under threatening circumstances.

### EMOTIONAL BREAKDOWN

A second empirical conclusion that can be drawn from past experiences of behavior under stress refers to the occurrence of chronic mental illness. Available source data strongly indicates that psychoses, prolonged depressions, and chronic neuroses are not caused by acute catastrophic situations. The incidence of these chronic psychiatric diseases, as reflected by admission rates to mental hospitals, was not particularly increased during World War II in England, Germany, and Japan;<sup>4,13,14</sup> neither did severe or persistent mental disease result from the atomic bombing of Hiroshima or Nagasaki, nor did such illnesses occur following the civilian disasters that have been studied in this country.

A third generalization of behavior under stress can be set forth because observations and reports are in essential agreement that the most frequent psychologic abnormality noted in traumatic situations is a temporary emotional disruption.<sup>4</sup> Persons so affected exhibit disturbances of function with manifestations that vary in severity from stunned, mute behavior or uncontrolled, purposeless flight to trembling tearful helplessness, apathetic depressed states, inappropriate activity, or preoccupation with somatic symptoms of emotional tension. Typically, such disorders are temporary, changeable reactions which are self-limited, lasting for minutes, hours, or days, and more rarely, weeks. Because they are disorganized or helpless, these persons are readily influenced by the attitudes of others, a fact that has practical application for the control of their symptoms and non-effective behavior following the cessation of danger.

While recovery from temporary emotional breakdown and return to functional capacity usually takes place within one or several days, residual manifestations that involve undue sensitivity to danger stimuli are common. These residue are usually evidenced by an increased state of apprehension which in some persons produces insomnia, heightened irritability, poor appetite, weight loss, and diminished work efficiency. Persons with more severe residual apprehension may absent themselves from work in a potential target area or seek relief by moving to another location of presumed safety. In most persons residual apprehension gradually diminishes over a period of weeks.

### FEAR

A fourth general characteristic of behavior under stress involves the frequency of, and the problem presented by, fear. When

the definition of fear is restricted to include distressing somatic and/or mental sensations, most observers and investigators of combat and civilian<sup>4,12</sup> disaster found that either the majority of people subjected to severe external trauma admitted that they experienced fear reactions, or its presence could be reasonably inferred from their behavior during the stressful period. However, fear reactions do not necessarily prevent effective and even extraordinarily courageous behavior, although it can be convincingly argued that the uncomfortable, subjective sensations of fear can only hinder rather than aid a person in his adaptation to a traumatic situation. For reasons that will be discussed later, it is herein postulated that a sufficient intensity of fear with its painful and inhibitory effect is the usual precursor out of which arises the transient emotional breakdown from severe external stress. The widespread occurrence of fear among persons exposed to danger can be considered a reservoir or a potential source of psychologic casualties.

The data thus far presented may be summarized by stating that the characteristic and common psychologic abnormalities produced by traumatic or disaster conditions include transient, fluid states of mental disruption and residual sequelae of increased apprehension. Similar psychologic problems should be expected in atomic warfare. The greater physical, and therefore more intense psychologic, trauma produced by nuclear weapons argues for increased and perhaps more severe psychiatric casualties than were noted in conventional warfare. Conversely, the brief duration of atomic stress as contrasted with the lengthy periods of tension and danger incurred under usual battle conditions would indicate a lessened frequency of psychologic disorders in atomic warfare. It is possible that the over-all incidence of emotional breakdown, as well as of physical injuries, will be similar in both types of warfare, with the major difference arising from the capacity of atomic weapons to cause large numbers of all types of casualties rapidly and in one location, as contrasted with the fluctuating but relatively constant smaller number of casualties that are produced from day to day over many areas of the battlefield in conventional combat. Obviously, if both conventional and nuclear weapons are used in tactical combat situations, along with atomic attack upon rear or support troops, an increase in psychologic as well as physical casualties can be expected.

Ideally, the prevention and treatment of these induced psychologic disorders should be based on control of causative agents and on measures to favorably influence the sustaining forces that maintain emotional equilibrium during such trying circumstances. However, the precise information required to implement such a

program is as yet unavailable because there is insufficient factual knowledge concerning the physiologic, psychologic, and sociologic mechanisms involved in individual and group reactions to severe external trauma. Reliance must still be placed on the previous observations and experiences of behavior under stress. It is mainly from these empirical data that the following operational approach to the problems of adaptation in atomic warfare is postulated.

### IMMEDIATE RESPONSE TO THREAT

Consider first behavior during and immediately after the impact of a nuclear explosion. For explanatory purposes, the mental process involved in responding to external stimuli can be divided into three sequential time phases, namely, perception, evaluation, and initiation of action. Usual or innocuous environmental changes evoke, when needed, rapid and appropriate responses in which evaluation plays little or no role as such because of automatic decision-making mechanisms that have been established through prior learning. However, new and abrupt situational changes require evaluation, and consequently there is an appreciable time lapse exhibited by most persons in their endeavor to respond to unusual stimuli. When abrupt environmental change is associated with a serious threat to life, experience indicates that the mental processes are significantly altered so that responses are either accelerated or inhibited. According to Rioch<sup>15</sup> this well-known and seemingly paradoxical phenomenon can best be explained by assuming that danger first produces an alerting reaction that operates simultaneously on the several components of the mental process to (1) focus the attention on pertinent elements of the threatening environment, thus narrowing the field of perception; (2) potentiate evaluation so that rapid decisions can be made; and (3) mobilize the bodily mechanisms for heightened and sustained physical activity.

When a person cannot cope with the danger because of the magnitude of the threat, other unalterable circumstances in the situation, or lack of confidence, the urging force contained in the alerting action promptly becomes transformed into the subjective, distressing physical and mental sensations of fear. Fear tends to interfere with the evaluatory function of the mental process. Even minor decisions become more difficult to make, and suggestibility, docility, and helpless dependency are common. Similar inhibitory sensations occur in the somatic sphere; the legs may feel rubbery and weak, speech is restricted, and breathing may be labored and difficult.

### TYPES OF FEAR RESPONSES

On the basis of the foregoing concepts, supported by observations in combat, behavior under the sudden impact of danger can

be reconstructed as follows. In about 15 to 25 per cent of exposed persons, prompt, purposeful responses are evoked which continue on into sustained effective activity.<sup>4,14</sup> Such persons apparently have a superior capacity to quickly grasp relevant details of a dangerous situation and can make rapid, appropriate decisions which will be promptly translated into immediate action. These effective participants in a disaster situation are "too busy" to feel fear during the period of danger, although soon after the emergency has passed some may note fear reactions on contemplating their narrow escape, while others appear excited and even elated as they eagerly discuss the events that have recently transpired.

The majority of persons confronted with sudden danger are stunned or bewildered<sup>4</sup> because they require an appreciable time to evaluate the situation. This inability to cope promptly and adequately with external threat produces acute inhibitory fear reactions which further burden the evaluatory process. With the passage of varying but brief periods of time and a consequent better grasp of their surroundings, most persons regain sufficient control to permit such goal-directed efforts as precipitous flight away from danger or quick movement to a place of presumed safety. While immediate concern is usually for self-survival, very soon thereafter social consciousness is reawakened in many persons who, even though handicapped by distressing fear, nevertheless perform unselfish acts in behalf of loved ones, comrades, friends, and even strangers. Military experience strongly indicates that with the resumption of purposeful activity, fear is diminished or dissipated. It would seem that when a person responds correctly to the urgent demands of the situation, tension is discharged. On the other hand, inaction under threatening circumstances fosters the building up of fearful sensations which only inhibit further, and thus a vicious cycle of worsening non-effective behavior is established.

#### BASIS OF FEAR REACTION

Psychologic breakdown occurs in those persons subjected to severe traumatic conditions who are unable to mobilize appropriate evasive or aggressive action and who in addition cannot tolerate the consequent intense fear reaction. Persons so affected do not suffer a literal breakdown of psychic function but exhibit a more primitive behavioral pattern that permits a decrease of personal involvement with intolerable reality. Emotional disorders of this type can be interpreted as meaningful behavior which has for its purpose the maintenance of the organism in situations of extreme personal discomfort, even though such an adaptation may be deleterious insofar as survival is concerned. Support for this hypothesis has been furnished by Rioch,<sup>15</sup> who

stated that neurophysiologic mechanisms do not permit random or unorganized activity except possibly for a few seconds during transition from one organized functional pattern to another of a higher or lower level of integration. Psychologic breakdown represents such a shift, from a highly organized flexible behavior capable of memory and judgment and presuming control by the cerebral cortex, to more simplified and stereotyped behavioral patterns associated with lower levels of integration such as are mediated by subcortical centers and the brain stem.

The mute, stunned reaction commonly observed under disaster conditions illustrates the purposeful nature of these stress-induced psychologic abnormalities. Here the involved person appears to isolate himself from the chaotic situation by apparently blocking the perception of external stimuli. Such persons are described as unemotional, blank, dazed, unresponsive to painful stimuli, and oblivious of any injuries that may have incurred.<sup>14</sup> Even more primitive is the uncontrolled, frantic behavior noted under catastrophic circumstances when the affected person seemingly responds to stimuli without discrimination, as if cortical control were lost and function were integrated at the brain stem level. Less severe forms of emotional disorder due to stress are characterized by a childish type of dependent adaptation that may be variously manifested by helplessness, trembling, or hysterical paralysis.

Consideration can now be given to the elements of the traumatic situation that influence behavior and thus the frequency both of acute fear reactions and of psychologic casualties.

#### INTENSITY AND DURATION OF TRAUMA

With the increasing magnitude of danger there is decreasing opportunity for appropriate action. Inability to cope with the threatening situation diminishes the probability that alertment will be translated into effective function and increases fear to the point of psychologic disruption and sequelae of undue apprehension. In traumatic situations of brief duration, favorable conditions are soon established for the resumption of effective behavior, whereas prolonged danger makes it increasingly difficult to maintain sustained, appropriate activity.

Another measure of the intensity of danger is the element of personal involvement, such as being knocked down by blast, buried in rubble, or injured by missiles. The greater psychologic trauma caused by intimate experience with danger has given rise to the concept of the "near miss" and the "remote miss."<sup>15</sup> Military and civilian stress situations are replete with examples indicating that the "near miss" is far more terrifying than the "remote miss," which in contrast seems to inculcate confidence that the



particular danger or threat can be successfully mastered. Often included in the "near miss" experience is the sight of mangled and mutilated bodies or other evidence of nearby destruction which is even more devastating when the deaths of loved ones, friends, and comrades are involved. Indeed, "near miss" events which do not include the observation of nearby casualties are much less traumatic and can more readily be tolerated.

### TRAINING

From the standpoint of prevention, the most important single influence on behavior in atomic stress lies in training and preparation for such an eventuality. It has been pointed out that failure of an adequate response to sudden danger not only decreases chances for survival but evokes crippling fear reactions that render the exposed person vulnerable to psychologic breakdown. Clearly, a built-in behavioral pattern is required for effective adaptation in catastrophic trauma so that appropriate action can be more promptly initiated. Such training should include measures to be taken immediately on atomic attack, as well as evasive or defensive precautions to be employed during any warning period that may exist. Adequate preparation should also include a sufficient knowledge of the several primary effects of atomic weapons, the fallout problem, and practical field methods of personal protection. Equipped with this information the individual again deals with a predictable environment that, no matter how terrifying, is less fear-producing than unknown danger.

### WARNING

Linked with training and preparation as potent determinants of behavior is the effect of warning prior to atomic attack. Even a brief warning period can enable prepared and disciplined groups to execute, at least partially, planned protective measures and to mobilize pre-set behavior for prompt action following the nuclear explosion. For untrained personnel, a short warning period before attack may well precipitate indecisive flight- or fear-induced paralysis of action, either of which is obviously deleterious to effective function or survival. Such unprepared groups necessarily require a relatively longer period of time to gain sufficient distance from the target area or absorb information regarding the best possible protection that can be employed under such circumstances.

### COMMUNICATION

The transmission of information has come to play an increasingly vital role in the control of behavior, especially for groups under stress, such as in civilian disaster or military combat. Human beings are poorly endowed, insofar as sensory organs are

concerned, for the perception of danger unless their immediate surroundings have been radically altered. Significant minor or gradual changes are commonly overlooked or attributed to innocuous events in order to deny sources of anxiety that would disturb emotional equilibrium. To overcome these deficiencies in human perception, sensitive mechanical means of detection have been devised, but a communication network is needed to transmit the data thus obtained to all persons concerned. It should be apparent that much depends on the efficiency of the communication system to transmit accurate and timely information so that proper evaluation can be made and appropriate action taken.

Like perception, the evaluative component of the mental process is also commonly impaired under stressful conditions. Here too, communication can become of major importance in determining behavior by directing the specific action to be taken. Under such circumstances, experience has demonstrated that not only must the information be clear and specific but such messages must be frequently repeated to counteract the disorganizing effects of fear which, among its many inhibitory characteristics, interferes with the mind's capacity for retention or recall of the immediate past.

### LEADERSHIP

The leader may be regarded as an essential link or agent of the communication system who interprets transmitted information together with data gathered directly from the environment and indicates to others the proper response or behavior to be followed. Because most persons under severe stress suffer a temporary impairment of their ability to maintain communication with the surroundings or within their own physical and mental organization, they seem to be out of contact with the environment or to exhibit a high degree of indecision and suggestibility. Under these conditions there is a need and often a demand for information and guidance, and leaders would arise even if they were not formally designated. In fact, such "emergent" leaders have been regularly observed in civil disasters<sup>19</sup> as well as in combat. It is probable that the more capable among the appointed leaders and those effective persons who respond spontaneously in the emergency situation have the ability to favorably use the facilitative reaction of alertness to initiate sustained appropriate activity and thus remain relatively free from the inhibitory effects of fear.

### GROUP IDENTIFICATION

Observation and experience indicate that the attitudes and characteristics of the group involved in a traumatic situation can profoundly affect the individual behavior of its members. Persons are better able to tolerate fear when exposed to danger along with

others similarly concerned. In fact, persons confronted with a common menace literally move toward one another for possible mutual protection and emotional support. This phenomenon has been regularly noted in combat and was also reported from England during World War II where community shelters were preferred over individual types of protection despite the added personal discomfort.<sup>4</sup> From the standpoint of communication, members of the group serve each other as verbal and nonverbal sources of information that may initiate and maintain constructive behavior or enhance apprehension and cause noneffective activity. With continued sharing of common hardships and danger there is commonly evoked a cohesiveness of the group which in military experience has been demonstrated to be a powerful force for effective performance even under severe stress.

### PREVENTION

From the above consideration of various elements in the traumatic situation which influence behavior, it is evident that any measures to lessen psychological breakdown or other forms of noneffective activity under conditions of atomic warfare necessarily must lie within the realm of command and cannot be a primary medical function. In this respect the situation presents no essential difference from other programs of preventive medicine in the military service that also require implementation that can only be initiated and maintained by command decision. The medical officer serves as a technical adviser to the commander in matters of physical and mental health. As part of this staff duty the medical officer should be thoroughly familiar with the determinants of behavior under adverse circumstances in order to better assist the commander in conserving the effective strength.

### TREATMENT

These disorders are acute, fluid, adaptive reactions to traumatic situations, are self-limited, and can be expected to improve with the cessation of danger. The persistence of such transient conditions after a reasonable period of time following removal of the causative situational trauma must be presumed to have some purposeful connection with the reality of the person's current environment. In the past this often has been found to be the permissive and indulgent atmosphere of the very treatment regimen that was designed for his recovery.

The methods of treatment proposed are derived from the accumulated experiences with similar emotional disorders due to combat. Through trial and error efforts during World War I, World War II, and the Korean campaign<sup>20</sup> there have evolved successful and practical therapy techniques which are based on the following operational principles.

**Decentralization.** This stresses the importance of the level or location where the treatment effort should be performed. Treatment facilities must be brought to the psychiatric casualty in the field instead of evacuation to a hospital facility. By a decentralized program, therapy would be made available as soon as possible and as near as practicable to the scene of the atomic attack. Benefits that can be expected from this policy include the following:

1. Treatment can be given early during the fluid stage when persons are more readily influenced to recover self-control by suggestion and other concrete measures, thus circumventing the emphasis on adaptive failure, made by time and continued helplessness, that produces chronic, undue apprehension.

2. Persons with psychiatric problems are prevented from entering evacuation and hospital facilities, which will be fully occupied by those physically injured.

3. Treatment at this level can promptly restore vitally needed, trained men who will be urgently required for defensive and rescue tasks.

**Expectancy.** This principle of therapy refers to the importance of verbal and nonverbal communication between patients and treatment personnel. It is based on the marked suggestibility and need for guidance exhibited by most persons who have been overwhelmed by external terror and are unable either to correctly perceive the outside world or adequately to make use of their perceptions for appropriate decisions. Military experience has demonstrated that whether persons with situationally induced, acute psychologic disorders worsen or improve depends on what is expected of them by persons responsible for their treatment and disposition. A treatment environment that communicates tension, helplessness, and disability prolongs symptoms and noneffective behavior. Conversely, calmly accepting the patient and regarding his manifestations as constituting a temporary incapacity, from which, after a brief rest, rapid recovery is expected, can produce improvement within hours, particularly when supervised or directed activity is promptly instituted as confirmation of these expectations. Attitudes and actions are far more effective than words in breaking through patients' barriers to communication. The mere verbal repetition of expectancy for recovery by treatment personnel who are not convinced that such psychologic disorders are self-limited and will improve is soon revealed to the patient for what it is by many nonverbal cues that indicate uncertainty or anxiety regarding the outcome.

Expectancy of recovery is also transmitted by the terms used to designate these disorders. In the past there has been an unfortunate spontaneous tendency to use descriptive and emotion-

ally charged terms, such as shell shock, psychoneurosis, and concussion, all of which convince the patient that he has suffered severe mental or physical damage from which recovery is uncertain and disabling residual defects common. Already the term radiation sickness is well known and could easily come into widespread use as a catchall for manifestations that do not fit a known physical disease. It is therefore imperative that such terms as combat fatigue be continued in atomic warfare, because their meaning indicates a transient benign disturbance due to logical situational conditions which leave no particular defect.

**Simplified Methods.** The requirements imposed by decentralization and expectancy render unrealistic any prolonged or involved treatment program. Such methods either could not be adequately performed at a decentralized level, or, if attempted, would nullify the principle of expectancy by the implication that the illness is serious enough to warrant such a major effort. In prior experience with complex treatment methods that rely on drugs, prolonged bed care, subshock insulin treatment, and frequent psychiatric interviews, only mediocre results were obtained despite the large outlay of personnel, time, and facilities. On the other hand, a brief rest of several hours, along with measures to relieve hunger, pain, or minor injury, when given at a decentralized level in an atmosphere of expectancy for recovery, provides the most favorable conditions for the restoration of impaired communication faculties and a resurgence to functional capacity. Drugs should be used sparingly, and preferably in small doses; relaxation can probably be as well obtained in most cases with warm drinks of cocoa, soup, and the like. If time permits, there should be included in this simplified program a brief interview during which the patient is encouraged to give his account of the traumatic event, not particularly for information purposes, but to facilitate the ventilation of his emotionally charged feelings and attitudes responsible for his withdrawal from painful reality. The ventilation of these emotional accompaniments of the traumatic experience often aids in re-establishing communication with the patient, who then can receive information and be motivated to participate in rescue and defensive efforts. The last step of this treatment method is supervised work. With resumption of purposeful activity and reorientation to group and social obligations, the ability to communicate further improves.

### DISCUSSION

These treatment methods pose a pertinent question, namely: Who shall be responsible for the management of psychologic disorders due to atomic trauma? A sufficient number of psychiatrists will not be available, nor are they needed for the operation of a simplified treatment program. From the traditional military stand-

point, the control of noneffective behavior under battle conditions is necessarily the responsibility of all persons charged with the function of leadership and medical care. As in conventional combat, the milder instances of "freezing," indecision, helpless attitudes, or inappropriate activity can best be handled by comrades, medical aid men, and noncommissioned and commissioned officers who are already on the scene and whose words and actions can influence or direct temporarily disorganized persons to assume a more effective role. Those with more persistent psychologic abnormalities should be treated at the nearest functioning medical facility, which in a tactical situation would most likely be an aid station. If the nuclear explosion were in a rear zone, it is probable that a hospital facility in the area would provide the most immediate organized medical care. In either event, the prompt treatment and restoration to duty of psychiatric casualties should become the recognized task of the first medical organization that receives them.

In atomic warfare, the battalion surgeon must assume more and more the role of a frontline psychiatrist in order to conserve the effective strength of his unit at a time when every man is vitally needed. Medical evacuation under such conditions will be a difficult procedure at best and initially, at least, should be reserved for those with physical injuries. The Korean campaign demonstrated that the battalion surgeon who was in a superior position to use the principles of decentralization and expectancy treatment could and did function effectively in a psychiatric capacity. Persons with severe or persistent conditions can be sent to the division psychiatrist at the clearing station level when time and transportation permit. The division psychiatrist should continue to serve as a professional consultant, to indoctrinate division medical officers in their psychiatric role, and to pay particular attention to his staff function as adviser to his commander on ways and means of preventing psychologic disorders.

In a hospital that becomes a frontline medical unit due to an atomic attack in its vicinity, it is recommended that a psychiatric and welfare section be established that would operate with a minimum of supplies and personnel and be located adjacent to the facilities for the physically injured. Such a function could be performed by Medical Service Corps officers trained in psychology or social work, Red Cross personnel, chaplains, and several enlisted technicians, along with a nurse to care for minor injuries. The assigned psychiatrists should serve only as consultants to this section during the emergency period, for as medical officers their services are more urgently required in the care of the physically injured.

## SUMMARY

Based on past military and civilian experiences of behavior under catastrophic trauma, the following assumptions and recommendations have been made regarding psychologic problems in atomic warfare.

The common psychologic abnormalities to be expected in atomic warfare are states of temporary mental disruption and their sequela of increased apprehensiveness.

Major determinants of behavior under conditions of atomic attack include the intensity and duration of the traumatic agent, training and preparation, efficiency of communication, leadership, and group unity.

Prevention of psychologic disorders in atomic warfare is a responsibility of command, with the medical officer serving in an advisory staff capacity.

Effective treatment of psychiatric casualties under conditions of atomic attack should be based on principles that include a decentralized or peripheral level of operation, expectancy for recovery, and brief simplified methods.

Treatment of psychiatric patients should be performed at the first medical facility to receive them so that rapid restoration to duty is accomplished. Battalion surgeons must necessarily function as frontline psychiatrists.

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### CITIZENS OF THE WORLD

"In our culture, from Newton to Einstein, science has always been an international enterprise. The giants upon whose shoulders the giant Newton stood were a German, Kepler; a Pole, Copernicus; and an Italian, Galileo. So our modern understanding of the nature of matter is the collaborative triumph of the French, Lavoisier, Pierre and Marie Curie, and de Broglie; the British, Dalton, Thomson, and Rutherford; the Russian, Mendeleyev; the Italian, Enrico Fermi; the Dane, Niels Bohr; the Germans, Einstein, Planck, and Heisenberg; the Americans, Gibbs, Michelson, and Millikan. This is why men of different nations, so often in the history of science, have made the same discovery simultaneously. Such coincidence is almost inevitable in the case of great discoveries. Within the same half-decade, Newton and Leibniz fashioned the powerful instrument of the calculus. Joseph Henry, an obscure schoolteacher in Troy, New York, anticipated almost every one of the basic experiments that won Michael Faraday his fame as the founder of electrical technology."

—GERARD PIEL  
in *Bulletin of the Atomic Scientists*  
p. 239, Sept. 1955



## A PSYCHIATRIC SERVICE AS A THERAPEUTIC COMMUNITY

HARRY A. WILMER, *Commander, MC, USNR*

**O**UR military services may be likened to a large patriarchal family that leads a somewhat rigid and lonely existence, whose fundamental mission is terrifying in wartime, and which in peacetime still lives in expectation of and preparedness for destruction. Its members, for the most part, are siblings involuntarily, as in any other family unit, and the stresses of their unquo communal existence create a number of psychiatric casualties. The psychiatrist called upon to manage these men during their initial psychiatric hospitalization deals with a special part of social psychiatry.

The psychiatrist in the military services has the somewhat anomalous mission of either helping his patients to accept an autocratic family or separating them from the service, not as successfully emancipated but as unsuccessfully incorporated—that is, as failures.

Given, then, a group of men who for emotional, mental, or personality reasons are considered unable to function in the fleet or ashore, what social structure in a military hospital would be most conducive to help them accept their status as patients and to help them control their often impulsive or aggressive behavior? This article reports the methods employed in a naval therapeutic community, whose goal was socialization, self-control, whatever therapy was possible to give, and enculturation in a mental hospital.

The psychiatric admission ward of this hospital has been operated as a therapeutic community for a period of four months. The concept of the hospital as a therapeutic community in which all time spent in hospital is considered therapy, while not new, was given great impetus during the last war. The community is like the family, and the emphasis is upon the interpersonal relationships not only of the patients but also of the staff. With certain modifications, this unit is modeled after suggestions and ideas I obtained during a recent visit to Dr. Maxwell Jones' Social

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From U. S. Naval Hospital, Oakland, Calif.

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Rehabilitation Unit,<sup>1-4</sup> Dr. T. P. Rees' Warlingham Park Hospital, and Dr. T. F. Main's Cassell Hospital,<sup>5</sup> all in England. While group therapy is an integral part of the program, it cannot be emphasized too much that it is not group therapy but the therapeutic community which is the basis of the program's communal existence as conceived and operated.

A 35-bed receiving ward in a 350-bed psychiatric service receiving over 1,000 admissions a year constituted a serious management problem which in the past seemed to necessitate the constant use of seclusion rooms and oral and parenteral sedation. Almost constantly patients could be heard beating on the "quiet room" doors, yelling, demanding, and behaving in altogether outrageous fashion, and on the ward there were frequent incidents—fights and altercations during which it was necessary to "isolate" patients.

The therapeutic community poses this question: Would it not be possible—if the staff *expected* patients to control their own aggressive impulses, and if the staff's and patients' anxieties and interpersonal relationships were under constant scrutiny and study—for the patients to behave as human beings are "supposed" to behave together? Would we not then have an additional force in our favor, in that we were dealing with a group of men accustomed to order and obedience, or at least who were a part of an orderly organization? If our emphasis were upon their *controlling themselves* rather than our controlling them, would it not be possible totally to eliminate the use of seclusion rooms and all but do away with sedation? When these questions were presented to the staff, they said: "But what will we do when patients become violent?" "But they won't," was the answer, which was the answer given me by Dr. Rees in England when I asked him this question. His reply was based on 20 years of experience. In short, the ward was to become the "patient's world" and not the "doctor's domain."

In four months of operation of the therapeutic community, 285 patients have passed through the ward, and not one patient has been placed in the seclusion rooms by the staff.\* No patient was given intravenous or intramuscular sedation, and not more than three dozen sleeping pills have been dispensed. No physical restraint has been used; no continuous baths, no camisoles, no cold wet packs have been prescribed.

Many of these patients were suicidal, homicidal, psychotic, previously violent and assaultive, and confined in seclusion

\*Three patients were placed in seclusion rooms during the night by Officers of the Day early in the operation of the receiving ward. They were kept in the seclusion rooms less than one hour.

rooms in other hospitals. Many arrived in restraints or strait jackets, and many prisoners were accompanied by armed guards. All patients were accepted in this ward, for there was no other ward and no other hospital to which they might be sent. The average stay on the ward was 10 days, after which time they were sent to a locked or open ward, depending upon their clinical condition. None was sent out earlier because of unmanageable behavior. The average daily census was 19 patients, with a range from 14 to 34. This is a special hospital situation dealing with a special patient population, a constantly changing group with an average per working day of three new patients arriving and three leaving.

Nonrestraint is nothing new. The Quaker retreat founded by William Tuke in 1794 at York, England, was the first asylum attempt at humane treatment of the insane, before Philippe Pinel, with the consent of the French National Assembly, on 24 May 1798, struck off the chains from 49 insane patients at Bicêtre. John Conolly in 1838 became physician in chief at Hanwell Asylum in England, and introduced the term "nonrestraint." Tuke wrote that the best form of restraint is self-restraint, and Conolly wrote that "after five years' experience, I have no hesitation in recording my opinion that . . . there is no asylum in the world in which all mechanical restraint may not be abolished, not only with perfect safety but with incalculable advantage." While everyone could see the advantages of eliminating chains, leather straps were often substituted for them, and there is still a tendency to substitute solitary confinement for those.

According to Zilboorg,<sup>6</sup> the question of nonrestraint was heatedly debated everywhere, and the humane and practical considerations clashed sharply. In the United States, the discussion of nonrestraint was so stormy that at one meeting of the Association of Medical Superintendents, Isaac Ray arose to express the opinion that nonrestraint might work with Europeans who, sane or insane, were accustomed to obey orders, but not with Americans who believe in liberty, and who unless restrained assert themselves even in a state of insanity.

When one does not have recourse to restraint or seclusion, there is greater demand upon the staff for attention to individual human needs and a call for greater ingenuity and resiliency in dealing with irrational or distressed people. Not only is there need for more attention to the supervision and management of patients, but also for the training and supervision of staff personnel.<sup>7</sup>

#### PATIENT SAMPLE

Patients were selected only in that they were all men previously screened for military service. A total of 250 consecutive cases

was analyzed in regard to certain social and medical features. The average age was 24.3 years, and 91.1 per cent were Caucasians. Two thirds of the remainder were Negroes. The average total length of previous military service was 4.7 years, and 18 patients had had less than six months' service. There were 172 naval personnel (75 per cent) and 78 Marine Corps personnel. There were nine naval officers (5.3 per cent) but no Marine Corps officers; but on the other hand, there were 14 Marine Corps sergeants (18 per cent) compared to 15 Navy Chief Petty Officers (8.8 per cent) suggesting that the psychiatric casualty risk was perhaps greater among enlisted marines who became noncommissioned officers. On the other hand, the risk among naval officers seemed to be greater than among Marine Corps officers, which may be related to the fact that naval officers may be drafted, while Marine Corps officers are volunteers. But there were no significant differences between rated and nonrated enlisted marines or sailors, though one may be drafted and the others were all volunteers (table 1).

TABLE 1. *Distribution of 250 consecutive psychiatric patients by rank*

Naval personnel			Marine Corps personnel		
Rank	Number	Per cent	Rank	Number	Per cent
Nonrated	93	54.0	Private	32	41.0
Rated	55	31.9	Private		
Chief	15	8.8	First Class	24	30.8
Officers	9	5.3	Corporal	8	10.2
			Sergeant	14	18.0
			Officers	0	0
Total	172	100.0		78	100.0

The duty station where they were admitted to the sick list was aboard ship in 32.4 per cent and ashore in the United States in 46 per cent, while 21.6 per cent came from shore stations beyond the continental limits (table 2).

**Diagnostic Categories.** The most common diagnoses were psychoses (44.4 per cent), the second was neuroses (35.6 per cent), and the last, personality disorders (20.0 per cent) (table 3). All of these patients formed the mixed ward composition, so that the very sick were mixed with the less sick, including patients with psychosomatic disorders referred from medical wards as unsuitable for military service because of such disorders as

TABLE 2. *Type of duty station from which 250 consecutive psychiatric patients were admitted*

Station	Number	Per cent
Ship*	81	32.4
Shore	115	46.0
Beyond continental limits**	54	21.6
Total	250	100.0

\*60 per cent from small ships; 29.3 per cent from carriers, 10.3 per cent from large ships.

\*\*Japan (including Korea), 15; Hawaii, 5; Alaska, 4; Okinawa, 2; Philippines, 2; Tinian, 1; Midway, 1; Guam, 1.

TABLE 3. *Diagnostic classification of 250 consecutive psychiatric patients*

Diagnostic category	Number	Per cent
Psychoses	111	44.4
Psychoneuroses	89	35.6
Personality disorders	50	20.0
Total	250	100.0

bed-wetting and sleepwalking. The mixture of these patients was by no means a disadvantage and rarely a problem. The specific diagnostic categories of the patients are shown in table 4. It will be noted that the most frequent personality disorders were passive-dependency reactions and passive-aggressive reactions, and among the neuroses the most common diagnoses were neurotic depressive reaction and anxiety reaction. Paranoid schizophrenic reaction and mixed schizophrenic reaction accounted for 72.1 per cent of the psychotic patients.

Alcoholism was a feature in 14 per cent of the patients, and over half of these were in disciplinary status. Alcoholism accounts for about 10 per cent of mental hospital admissions in nonmilitary hospitals. A slightly smaller per cent of patients gave a history of alcoholism in the father; two thirds of these patients were themselves alcoholic. Over 25 per cent of the total patient sample were awaiting court-martial or had had court-martial in their service career. All patients admitted to the naval brig passed through this ward, but remained on the ward only if there was a concurrent psychiatric diagnosis.

TABLE 4. *Diagnoses in 250 consecutive psychiatric patients*

Diagnosis	Number	Per cent
<i>Personality disorders</i>		
Passive dependency reaction	17	34.0
Passive aggressive reaction*	13	26.0
Emotional instability reaction	7	14.0
Immaturity reaction	6	12.0
Schizoid personality	5	10.0
Inadequate personality	1	2.0
Asocial personality	1	2.0
Total	50	100.0
<i>Psychoneuroses</i>		
Neurotic depressive reaction	35	39.4
Anxiety reaction	32	35.9
Conversion reaction**	14	15.8
Chronic alcoholism	3	3.4
Phobic reaction	2	2.2
Obsessive compulsive	1	1.1
Acute situational maladjustment	1	1.1
Sexual deviate	1	1.1
Total	89	100.0
<i>Psychoses</i>		
Schizophrenic reaction		
Paranoid	39	35.2
Not elsewhere classified	42	37.8
Latent	6	5.4
Catatonic	4	3.6
Simple	3	2.7
Hebephrenic	2	1.8
Other		
With demonstrable organic disease	7	6.3
Delirium tremens	5	4.5
Manic depressive	3	2.7
Total	111	100.0

\*1 of narcotic addiction.

\*\*4 of psychogenic gastrointestinal disorders.

Since the ward is thought of in terms of the family unit and the patients are considered as social casualties from the large service family, it is important to consider the number of patients who come from broken homes. A broken family is one disrupted by divorce, separation, or death of one or both parents. In the United

States, broken families constitute one ninth of all families, and death is by far the chief cause of family disruption (over 50 per cent). In our patient sample there were 40.8 per cent from broken homes, and death accounted for 41.2 per cent of these. The incidence of broken homes was four times as great in psychiatric admissions as compared with the general population (tables 5 and 6).

TABLE 5. *Incidence of broken homes in 250 consecutive psychiatric patients before the age of 15*

Event	Times occurring	Per cent of patients	Average age of patient at event (yrs)
Death of father	24	9.6	8.3
Death of mother	18	7.2	5.4
Total deaths of either or both parents	42	16.8	7.0
Divorce or separation	60	24.0	5.5
Total deaths and divorce/separation	102	40.8	7.6

TABLE 6. *Incidence of crimes of violence or psychosis in parents of 250 consecutive psychiatric patients*

Event	Times occurring	Total	Per cent of patients
Crimes of violence			
Father raped patient's sister	2		
Father murdered mother	2		
Father sentenced for murder of other than mother	1		
Father executed for murder	1	6	2.4
Psychosis			
In mother	5		
In father	2	7	2.8
Total		13	5.2

#### WARD ROUTINES

The ward is a locked temporary structure from which no patient is permitted to leave unattended at any time. There is an en-

closed adjoining courtyard. Ward meetings are held daily from 0845 to 0930 hours Monday through Friday. It was believed that with daily meetings, it would be unlikely that many ward tensions could build up to a point where they would spill over into the "acting" area rather than the "talking" area. All the patients on the ward attended all the meetings. Each patient was seen within an hour of admission by the ward medical officer, and was told of the ward meetings and that he was "expected" to attend. When a patient was admitted after working hours, he was seen by the officer of the day. There have been only three patients who have constituted a matter of group concern because of their wish not to attend the meeting, but each remained in the group, sitting at the edge.

Any topic of discussion is permitted, and the emphasis has almost invariably been focused on the "here and now." Only in the initial groups, before a ward culture<sup>8</sup> existed, was there any prolonged discussion about "practical matters" such as ward lights being too bright at night, cigarettes, the medico-legal matters of their service disability, coffee, food, et cetera. There is a constantly changing complexion of the group, usually stimulated by the more articulate neurotic patients, especially those with considerable anxiety, by the aggressive, disturbed, delusional psychotics, and by the angry "psychopaths." Silence is not uncommon. One group was totally silent for an entire session, and frequently the initial silence may vary from a few minutes to 15 minutes.

All nurses, corpsmen, and doctors are present at all groups, with the exception of one needed in the front office and for occasional ward routines. The presence of female nurses adds a measure of decorum, and the patients are quite ruthless with any member, psychotic or not, who uses profanity. As a matter of fact, "acceptable behavior" and conduct is a frequent topic. Three patients, all psychotic, have struck other patients or have been struck. One was under the delusion that all the ward thought he had stolen \$70,000 from an aircraft carrier (his superior officer had been missing simultaneously with the ship's loss of this sum, just prior to the patient's psychotic break). Although the patients were afraid of such a sick, irrational, violent person, the episode lasted only two days. The group responded to this patient with incredulous reality comments. The following day the paranoid patient began the hour by saying he thought everyone in the room was a relative or close friend (his current delusion), and he never struck a patient in the ward thereafter.

The ward is not a disturbed ward, but only a potentially disturbed ward. The group meetings seem like any group of sailors in a "bull session" *except* that there is a remarkable degree of



sophistication and almost total lack of profanity. Often the patients say penetrating, gentle, or even brilliant things to help each other, things that any psychiatrist might wish he had said. Left to their own devices, treated with genuine consideration and seriousness, with a real desire by the staff to help, they speak like seasoned therapists, prefacing their comments with such phrases as "could it be that you believe . . ." or "I wonder if you are bothered by . . ." or "what do you mean by the word 'gentleman' . . ." or "yesterday you said . . ." or "why do you feel as if . . ."

Occasionally the corpsmen or nurses speak in the group, and not infrequently the "leader" says very little except to give a summary of the hour in the last one to five minutes.

After each group meeting, the staff has a half-hour meeting in the doctor's office, during which time the group behavior and comments are analyzed. Particular attention is focused on who said what first, who said what to whom and why, and what changes are observed in the sicker patients. The leader is immeasurably helped by so many observers, and once a very young corpsman said to the doctor, "Why were you anxious when . . ." It was my first awareness of the point, which was well taken.

The more bizarre the psychotic patient, particularly in the more manic or hebephrenic categories, the more the group seems to deny his "insanity" and consider him a malingerer. The more fearful, hallucinating, or suspicious are literally nursed and doctored by many patients. The daily groups have been found to keep a group feeling in operation, and prying and splintering off is kept to a minimum, though it is to be remembered that the patients are in this ward only a short time. In the staff meeting, because of the constant feedback of communication in the whole psychiatric hospital, we are kept informed on how patients who have left the unit are getting along on other wards.

From the very start, the staff has made careful observations of where the patients place their chairs. The ward is long and narrow and the leader always sits in the same chair. Others bring their chairs and sit in varying group configurations. It has been invariably observed that the greater the ward tension, the more they congregate at the north end of the ward, where the exit door is located. This has come to be known as the "fire escape maneuver." When a very disturbed psychotic patient is present, all patients may sit at the north end of the ward. It is possible to guess the role a patient will take in a meeting if he occupies a certain chair. In our particular ward culture, we now know that there is a "speaker of the house" chair, located prominently and usually alone, either at the north or south end of the group, and

a "guest of honor" chair directly across from the leader's; the latter is usually occupied only for one or two sessions by the same person. It is also an "oppositional" chair, which is probably why it is occupied for such brief times. In subsequent meetings, the occupant then moves nearer the leader or far back into the group. The most aggressive "psychopaths" sit in the "sulking" chair (sometimes called the "coroner's" chair) at the far north or south edge of the group, on the same side of the room as the leader. There is also a "preacher's" chair, the "right-hand" chair (of the leader), and the "deputy leader's" chair (on the left side). The older naval "chief's" chair is to the side, and clusters tend to gather by the door to the courtyard.

The group moves closer to the leader when they are more "friendly" or comfortable, and farther from him when they are angry at his ineffectualness in calming or punishing an aggressive "antigroup" psychotic patient. But always they seem to move as a group, clustering, pulling away, pulling toward the verbal members and the leader, depending on how they feel toward these individuals at a particular time. Seating is never interpreted in the ward meeting. Individual behavior is that which is group-acceptable. It is apparent to all when patients speak insincerely, are very guarded, or are trying to be "good group members," and their contributions usually lead to silence from the other members. When a patient is deeply moved by what he is saying, or telling the group about a very emotionally charged situation, he will almost invariably be joined by others who want to know more, tell their own stories which bear close relationship, or actively help him with his feelings.

On occasion, when the group is struggling with important material and is unable to put it clearly into words, the leader employs any one of a series of 16 short, recorded dialogues dealing with parent-child conflicts, illustrating a point at issue such as "revenge," "neurotic demands," "regression," "aggression," et cetera.\* These were especially prepared for group meetings.\* They are played only on the clues from topics presently meaningful after the group has been going for 20 minutes or so. They are unfinished stories which the group completes. Other sound stimuli are 21 brief and more vague sounds,<sup>10,11</sup> such as the sound of an angry father, without any clue as to why he is angry, et cetera.\*\* These records have proved of great value if chosen appropriately to the point at issue and played at the proper moment, just as an interpretation, properly timed, is made

\*The text of these records have been published,<sup>9</sup> and the records are available for research work by others.

\*\*These records I have described previously as constituting a sound association technique,<sup>10,11</sup> and they are available for research work by others.

about what is being discussed and what it related to at one time. They have been of even greater value when played to staff meetings for analysis of what was said or done and of why and how.<sup>12, 13</sup>

In addition to the full staff meeting immediately after the group meetings, there is an hour meeting once a week with the ward corpsmen and once a week with all the nurses in the psychiatric wards who wish to come. The sincere desire of the nursing and corpsmen staff to treat people with human dignity is both moving and rewarding.

The staff of the receiving ward includes a medical ward officer (myself), nurses, corpsmen, a clinical psychologist, a psychiatric social worker, and occasionally an intern or resident. When there are visitors to the group, which is not encouraged, their effect on the group is always scrutinized with considerable interest.

Certain reality limitations imposed by the nature of the ward and the military service make this a special sort of therapeutic community. Here the process of acculturation becomes a group process and patients become a part of a mental hospital prior to transfer to other wards. We are dealing with a *given patient population*. The patients who have been there longest move out first. We also are dealing with a *given staff*, there being no selection of members beyond that of the routine processes of transfer and assignment. We have made no effort to select our nurses or corpsmen, but do make intensive efforts to train them as a vital part of our team.

In general it can be said that the formal therapy of the patients begins at the group meeting and ends with the conclusion of the staff meeting, a total of 1 hour and 15 minutes a day for 14 to 34 patients. The routine work of the ward includes an admission interview with each patient, lasting an average of 45 minutes, and all the tasks of an active receiving ward such as telephone and personal interview with relatives, transfer to other wards, and such interviews with individual patients as are requested by the patient or considered important by the ward medical officer. One patient is always carried in continuous daily therapy by the leader, to give him further insight into the group dynamics.

On the bulletin board in the ward is posted a piece of paper on which any patient who wishes to see the doctor individually may write his name. Patients are seen in strict sequence in which their names appear, and usually within 24 hours each name is conspicuously checked. In this way everyone on the ward knows who sees the doctor and how often, and no verbal promises are made which might be forgotten. The content of these request interviews generally involves personal matters that are not

appropriate for group discussion, individual service problems, and questions of when a man will leave the ward and if he is going to an open or closed ward. There is no question but that the patients are apprehensive about being sent to a locked ward, and many patients remain silent in the groups for fear they will say the wrong thing and be sent to a closed ward. But they do not hesitate to talk about the staff if they wish, and the only patient who was "threatened" by a corpsman started talking about it the very second the hour began. Names are used, and if patients are reluctant to use names either of patients or of staff members, it is always a topic for leader interpretation; this almost invariably results in names being used.

### QUIET ROOM

The "quiet rooms" are not necessary to control patients who, given a chance, will control themselves. Patients will control themselves within the limits of which they are capable, if the staff's attitude is that they are capable of self-control. Patients who in their previous hospital stay have torn pillow cases, urinated on the floor, or assaulted corpsmen, simply behave in an acceptable fashion when subjected to the socializing pressure of the patient group. Moreover, seclusion is almost always considered to be "punitive," and the almost universal expressions of "being thrown into the quiet room," "placed in quiet room without force," or "placed in quiet room with force" are self-revealing.

Patients admitted to the receiving ward have many of their possessions "confiscated": matches, lighters, often glasses, clothes, et cetera. To confiscate their freedom by solitary confinement is a fearful experience. It has been observed that many of the patients previously placed in seclusion rooms were troubled by claustrophobia and suffered terribly. Others who are existing with the frightening belief that they are about to lose control of themselves and do all sorts of incredible things have their fears confirmed by this action; it is as though the staff acknowledges this fear as reality-based and says, in effect: You *are* in danger of losing control! How much more reassuring to say, by actions: You won't lose control, and the patients will help you control yourself. Furthermore, when they are locked up in "cells" delusional patients often experience an intense activation of their irrational fears, and their voices tell them all sorts of bizarre things. Calling seclusion rooms "quiet rooms" is a strange euphemism; to be truthful, we should call them "noisy rooms" and the wards "quiet wards." If seclusion rooms are not used, the staff must be tolerant of an occasionally noisy and tense ward, in the belief that it can best be handled in communal living.

Some patients locked or placed in quiet rooms feel they have been sent into the corner, locked in the closet, ostracized. Some patients come to us *asking for the quiet room*, which is always refused. A patient's request for the quiet room may be a symptom of the wish to withdraw, when what he most needs is help in belonging. Others request this out of a fear they will be placed in the quiet room and they wish to "beat the staff to the punch" to show that *they*, not the staff, are in control of this business. After acquiescence in this neurotic or manipulative retreat is not just fostering acting out, but actually participating in it.

It is vitally important to realize that patients will often feel they have a license "to act crazy" because they are on a psychiatric ward; the less sick will exploit any chance to retaliate in their resentment of their confinement, and the more sick may use the "acting crazy" as reassurance that their "insanity" is under their own control, i. e., they can turn it off and on as they wish. They can use the quiet room in a masochistic way by confirming their avowed belief they are in the "nut house." But people cannot "belong" unless they are with people, unless they can see they will be accepted however they are, though their fears tell them otherwise. And to some patients, not belonging is not being, and not being is nonexistence or death or fostering of autistic life. What they need most of all is to judge, test, and live in reality relationships with other people.

Many extremely provocative patients come to our unit, literally and figuratively asking for punishment. This is particularly true of psychopaths who have had prison or brig experiences, and of paranoid schizophrenics who have been in "quiet rooms" and constantly or intermittently given sedatives. Such patients seem at first to be utterly bewildered by their treatment in our unit. Coming into a new hospital, they cannot believe it when the nurses or corpsmen refuse to be provoked, or at least outwardly punitive. Once in a while it appears to me that some of the corpsmen and an occasional nurse are tempted, but still the pressures of their group seem to be successful in preventing them from yielding to these impulses.

One day I came to the ward and heard a piano. Upon investigating, I found that the mattress had been moved from the floor of a quiet room and a piano had been placed there. The only other quiet room on the ward has been converted into an office.

#### SEDATION

Patients transferred from one service psychiatric hospital to another are almost always given a sedative prior to transfer and frequently en route. The routine administration of sedation prior to transfer seems not only unnecessary but also unwise. Many of

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these patients are quite confused and their sensorium is further clouded by drugs, so things which should be clear are vague and shadowy. On the receiving ward, new patients will frequently ask for sleeping medication. Many state they have had nightly medication and cannot sleep without drugs. Each such patient is interviewed alone, and it is explained that people become dependent on drugs and we only prescribe sleeping pills under unusual circumstances. Very few patients have ever asked again. They seem to have a bad night or two and then sleep. They seem quite thankful to be free of the drugs.

It is a much more difficult task to refuse sleeping pills than to give them. For one thing, an explanation is necessary; furthermore, anxious patients can produce considerable anxiety in their doctors and nurses. The professional staff then responds by anesthetizing the patient whose anxiety *they* cannot tolerate. Sleeping pills seem to be given to a great many hospitalized patients because the staff is more concerned about *their* sleep and anxiety than the patients'. When insomnia becomes a matter of concern for several patients, the group may devote almost all their time discussing the causes of insomnia, and after such sessions it has been our experience that the insomnia and restlessness in the night disappears from the ward. Thorazine (brand of chlorpromazine hydrochloride) or Serpasil (brand of reserpine) has been given to only eight per cent of the patients.

The manifest and latent content of the group discussions, their continuity from day to day and their recurrent themes, and the group dynamics of this particular type of constantly changing group will be the subjects of a subsequent communication.

While there are intriguing dynamic factors which are constantly observed and interpreted to the staff in psychoanalytic terms, there are features about the therapeutic community which can also be understood in terms of the physical analogy of mechanical adaptation. Thompson<sup>14</sup> wrote that "there is a certain principle, much to the fore in the construction of the skeleton, well known to the designer of a hydroplane or 'flying boat,' and not wholly neglected by the bridge-building engineer; it is the principle of nonrigid, flexible, or *elastic stability*. (India rubber has great elastic stability, though it is not compressible.) A homely comparison between a basket and a tin can can tell us in a moment what it means, and shows us some at least of its peculiar advantages. This method of construction helps to *distribute* the load, bridges over points or areas where pressure might be unduly concentrated or confined, adapts itself to a sudden impact or concentrated stress, helps to lessen or guard against *shock*, and imparts to the whole structure a quality which we may call,

for short, *resiliency* . . . We see a tendency for material to be laid down in the skeleton in the lines of *stress* and so to evade thereby the distortions and disruptions due to *shear*. In these phenomena there lies a definite law of growth, whatever its ultimate expression or explanation may be. Let us not press either argument or hypothesis too far."

### SUMMARY

A 35-bed receiving psychiatric service in a 350-bed psychiatric naval hospital has been operated as a therapeutic community for a period of four months, during which time 285 patients were in residence for an average period of 10 days each. Almost half of these patients were acutely psychotic and in their first breakdown. With the constantly changing population in this ward, daily meetings of all patients were held on the ward, followed by staff meetings.

The efforts to foster acculturation of the patients by the patients with staff help and encouragement have made it possible totally to eliminate the use of the quiet room and parenteral sedation, and greatly to diminish the amount of oral sedation. Eight per cent of the patients received Thorazine or Seralasil.

By daily working with the patients and the staff, so that each 24-hour period was constantly scrutinized as therapy, a previously disturbed ward was changed to a potentially disturbed ward.

This communication emphasizes the socialization and changes in human behavior resulting from simple, humane care of patients, which has from earliest times characterized the proper care of the sick.

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# OPERATION "CHEST DISEASE"

JOHN F. CHACE, *Captain, MC, USN*  
E. P. COFFAY, Jr., *Lieutenant, MC, USNR*

**D**URING 1954 the U. S. Navy successfully examined 1,543,644 persons by means of 70-millimeter photofluorographic chest x-rays. Of these, 1,717 were disqualified for possible tuberculous lesions and 2,336 for other chest conditions of a non-tuberculous nature. Thus, 4,053 persons, or about 1 out of every 400 examined, were either hospitalized for clinical study or referred to chest clinics for further evaluation.

The tuberculosis control program of the U. S. Navy, as it exists today, was initiated in 1941 and consists primarily of the following three basic study programs: (1) routine chest roentgenographic examinations of both military and civilian personnel upon their entering service, upon their discharge from service, and at annual intervals when practicable; (2) routine tuberculin skin testing of all Navy and Marine Corps recruits; plus special intensive studies of medical and dental personnel on duty in U. S. naval hospitals within the continental limits, because medical and dental personnel have an incidence rate for tuberculosis approximately double that for the U. S. Navy as a whole;<sup>1</sup> and (3) the isolation, study, and treatment in U. S. naval hospitals of personnel suspected of having chest disease, with emphasis on transfer of such patients to the pulmonary diagnostic and treatment centers at the U. S. Naval Hospital, St. Albans, Long Island, N. Y.; and the U. S. Naval Hospital, San Diego, Calif.

The purpose of this article is twofold: (1) to outline the work of the Preventive Medicine Division of the Navy Bureau of Medicine and Surgery in administering case-finding procedures in the tuberculosis control program; and (2) to present the data on successful examinations and suspected disease obtained in 1954 by means of 70-mm photofluorographic films.

There are 103 photofluorographic units throughout the United States and overseas where roentgenographic examinations of the chest are made by the Navy. Eleven of these units are mounted on buses and two are transportable. For economy, convenience, and speed, almost all stations use photofluorographic equipment for taking survey 70-mm films. An immediate interpretation of



the film is made at the various stations, and 14- by 17-inch celluloid films are ordered for those individuals whose 70-mm films reveal suspicious findings. If the suspicious area is verified by the 14- by 17-inch film, the serviceman is sent to a naval hospital for consultation or admission as appropriate.

In the case of civilian personnel employed by the Navy, those who are found to have suspicious 70-mm films, confirmed by 14- by 17-inch films, are referred to their private physician or local medical facility for clinical evaluation. They may not return to work until acceptable proof has been furnished of a clinical examination showing that no disease in a communicable state is present. Their jobs are retained for them while they are on sick leave, however, if so desired.

Each month all 70-mm films that have been taken are mailed to the Tuberculosis Control Section of the Bureau of Medicine and Surgery of the Department of the Navy in Washington, D. C. The films are accompanied by a log that gives pertinent identification and information, as well as the interpretation of each film by the roentgenologist. The 14- by 17-inch films taken because of suspected pathologic conditions are kept at the station, but copies of the reports on those films are forwarded to the Bureau.

The advisability of second readings of 70-mm films has been established by Yerushalmy,<sup>2</sup> Groth-Petersen, Lövgroen, and Thillmann,<sup>3</sup> and others. The Navy has practiced this dual reading for the past 10 years. A course of instruction in the interpretation of photofluorographic films is offered by the U. S. Naval Medical School, Bethesda, Md., for qualified officers of the Medical Corps who express an interest in this subject. The officer is trained for about three months, and during his training period will review under supervision the films and interpretations submitted by the 103 activities taking the films. This serves the dual purposes of enabling the Preventive Medicine Division to review and re-evaluate the films taken in the field, and of training medical officers in the interpretation of chest x-rays so that superior and more uniform reading of films will be made at the various activities throughout the Navy where roentgenologists are not available.

If a 70-mm film that was not interpreted in the field as abnormal is found in the course of re-reading to be suspicious, the Tuberculosis Control Section sends a letter to the commanding officer of the activity at which the film was taken, requesting that the subject be recalled for a 14- by 17-inch celluloid film. A copy of the report of the report examination is mailed as soon as possible to the Bureau of Medicine and Surgery, and is filed for reference. At the completion of the second reading, the 70-mm films are packed, marked, and mailed to the U. S. Naval Records Management Center, Garden City, Long Island, N. Y., where they are stored for future reference.

Ideally, it would be desirable to maintain a central file of follow-up findings on each suspicious photofluorogram, including a record of the final disposition of the subject. Practically, this has not been feasible, but service personnel have entries made in their medical records of the x-ray findings and consultations, so that at the local level the complete story is available to the physician holding the medical record. The large number of civilians with suspicious findings on photofluorograms are referred to family physicians or public health chest clinics for follow-up. Administratively, it would be extremely difficult and time consuming to attempt to obtain the results of their studies in each individual case. For these reasons the only data available concerns the total number of suspicious films found in a given year, and it is not possible to report final data on the number and nature of pathologic findings discovered as a result of photofluorographic examinations.

### RESULTS OF STUDIES

Bircher and Castle,<sup>4</sup> in their study of 348,875 persons examined over a four-month period by the Navy, were able to adequately evaluate 659 of 773 people referred to the hospital for possible chest conditions. Of 659 patients, 284 were *not* admitted to hospitals and 86 were admitted for unrelated pathologic conditions. This left only 289 people (43.9 per cent) with 293 established diagnoses compatible with the original suspicious findings on photofluorographic examinations. They found that 9.6 per cent of the original 659 patients who had been referred for clinical study had active tuberculosis. They then estimated that one case of active tuberculosis will be found for every 5,538 photofluorograms.

Based on the conclusion that it is relatively impossible to make an exhaustive follow-up study at this Bureau, a correlative pilot study has been undertaken and will be reported upon its completion. It involves a continuing survey of proven cases of pulmonary tuberculosis at the two pulmonary disease centers of the U. S. Navy, with determination of the reason these patients were hospitalized. By this method, it is anticipated that the number of persons with active pulmonary tuberculosis admitted to naval hospitals as a direct result of the periodic x-ray program can be determined more precisely.

For statistical purposes, the individuals examined during the year 1954 are divided into four categories: (1) service—Navy and Marine Corps personnel on active duty or retired, and members of Naval Reserve Officers Training Corps and reserve units; (2) civilian—employees of the U. S. Navy, Federal Bureau of Investigation, Veterans Aid Benefit, and Bureau of Employees Compensation; (3) dependents—only dependents of Marine Corps and Navy personnel; and (4) others—Army and Air Force military personnel, and their dependents; also foreign military personnel.

Table 1 gives the breakdown according to the above grouping of persons examined and suspicious films found. It should be noted that in the survey of 1,543,644 individuals a second 70-mm oriented roentgen was taken in 33,871 cases, because the first film was found to be technically unsatisfactory for reading and had to be discarded.

Of the 1,543,644 persons examined by satisfactory 70-mm photographs, 38,007 (2.5 per cent) were initially suspected of showing possible lesions and were recalled for 14- by 17-inch celluloid films. On reading the 38,007 large films, confirmatory evidence was found in 4,053 cases (10.7 per cent). These patients were hospitalized for clinical investigation.

The 1,676 military personnel referred for clinical evaluation represented only 1.7 per 1,000 of the total military population examined, as contrasted with 5.2 per 1,000 of civilian employees referred for study. The higher civilian rate is to be expected, considering that the civilians comprise an older age group and are not required to pass rigid physical examinations as are Navy and Marine Corps personnel.

The total civilian population employed by the U. S. Navy during calendar year 1954 was 368,091 (excluding those who are examined by the Civilian Employees' Health Service of the Department of Defense). The Navy successfully examined 376,797 (97.1 per cent) of these employees, and most of the 2.9 per cent not examined may be accounted for as being on annual or sick leave at the time a mobile or stationary unit was conducting the yearly survey.

TABLE 1. Summary of findings; Navy 70-mm photo/fluorographic program, 1954

Category of subject	Number* of persons examined	Number with suspicious lesions			Number hospitalized for clinical study
		Total	Field reading	Bureau review (additional)	
Total	1,543,644	38,007	36,618	1,389	4,053
Military personnel**	1,112,359	25,298	24,486	812	1,878
Civil-service employees	376,797	11,610	11,091	519	1,969
Dependents of Navy and Marine Corps personnel	49,379	887	829	58	137
Others	5,109	212	212	0	69

\*On 33,871 of these persons, a re-take was required to obtain a satisfactory photo/fluorogram.

\*\*Includes Navy and Marine Corps active-duty and retired personnel, and reserves not on active duty.

TABLE 2. Presumptive diagnoses prompting referral for clinical study as a result of the Navy 70-mm photo/fluorographic program, 1954

Category of subject	Total	Suspicious for		Rate per 1,000		
		Tuberculosis	Other conditions	Total	Tuberculosis	Nontuberculosis
Total	4,053	1,717	2,336	2.6	1.1	1.5
Military personnel	1,878	741	1,137	1.7	0.7	1.0
Civil-service employees	1,969	900	1,069	5.2	2.4	2.8
Dependents of Navy and Marine Corps personnel	137	56	81	2.8	1.1	1.7
Others	69	20	49	13.5	3.9	9.6

were examined by local county or city health department facilities, but it appears desirable to obtain a larger survey coverage of this group in order to reduce the possible contact of military personnel with tuberculosis.

The rates reported in table 2 under the category of "Others" relate to a population of only 5,109, which is too small for statistical significance.

Table 3 gives the results of the second reading, or review, by the Bureau of Medicine and Surgery of all films taken in the field. An additional 1,389 suspicious 70-mm films were found, and letters were sent concerning the suspects requesting 14- by 17-inch chest roentgenograms. From the 1,389 requests, 908 replies were received, representing a response of 65.3 per cent.

TABLE 3. *Results of review of photofluorograms at Bureau of Medicine and Surgery 1954*

Category of subject	Number found with suspicious lesions		Replies indicating that case was referred for further study		
	Letters sent	Replies received	Total	Suspected tuberculosis	Other conditions
Total	1,389	908	165	95	70
Military	812	498	53	30	23
Civilian	519	372	108	62	46
Dependents	58	38	4	3	1

No reports were received by the Bureau of Medicine and Surgery relating to 481 persons for whom re-examinations were requested. Many of these examinations may have been performed at the local level and proper disposition of the individual cases made; but since no official notification was received from this rather substantial group, no interpretation nor comparison of the data included in table 3 can be made with any degree of accuracy. It merely can be stated that of the 908 replies received, 165 indicated that the subjects were referred to various medical activities for further clinical evaluation, 95 for possible tuberculosis, and 70 for other types of chest disease.

#### SUMMARY

The U. S. Navy controls its tuberculosis problem by (1) an annual 70-mm photofluorogram screening program; (2) routine tuberculin skin testing of all Navy and Marine Corps recruits; and (3) the isolation, study, and treatment of patients with chest disease at centers established at the U. S. Naval Hospitals at St. Albans, Long Island, N. Y., and San Diego, Calif.

During the calendar year 1954 mobile and stationary units successfully examined 1,543,644 persons by photofluorograms; of these, 1,717 were disqualified from work or duty for possible pulmonary tuberculosis, and 2,336 for other possible pulmonary disease. Among the persons referred for study, 95 suspected of having tuberculosis and 70 suspected of having other chest disease were discovered as a result of reviewing all films at the Bureau of Medicine and Surgery.

**ACKNOWLEDGEMENT:** The authors wish to express their appreciation to Dr. W. V. Charter and Mr. L. P. Hellman of the Bureau of Medicine and Surgery for their aid in preparation and interpretation of the tables.

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#### ONE DOCTOR PER —.

According to the most recent available figures,\* the following list shows the population per physician in representative countries of the world:

United States	777	Austria	646
Canada	989	USSR	758
Mexico	2,504	Italy	841
Argentina	1,378	Spain	1,012
Venezuela	1,907	France	1,146
Brazil	3,288	United Kingdom	1,145
Israel	431	Japan	1,055
Iran	2,302	India	5,806
Egypt	3,625	China	22,000
Syria	5,276	Pakistan	36,000
Algeria	5,304	Ethiopia	164,000

\**Bull. World Health Organ.* 13: 345, 1955.

# ROLE OF THE HYPERIMMUNE REACTION IN CHANCROID

## Effect of ACTH

DONALD E. TYLER, *Lieutenant, MC, USNR*

THE usually described features of chancroid are the characteristic penile ulcers appearing after intercourse, buboes, positive results of the Ito-Reenstierna test, and the isolation of *Hemophilus ducreyi* from the ulcer and from the secondary pustules at the sites of artificially induced autoinoculation.<sup>1-3</sup> The primary ulcer is sometimes herpetiform in nature, but it is frequently ragged, dirty, tender, and nonindurated, and it tends to bleed easily. Some of the patients then experience pronounced inguinal adenitis, or buboes, which may be either unilateral or bilateral. These inflamed nodes may enlarge rapidly and become exquisitely tender; in this stage, the skin overlying the lymph nodes is usually a deep red, surrounded by a lighter blanchable zone several inches in diameter.

The striking deep-red color of the skin overlying the node and the surrounding lighter erythema are the same color as the red-centered Ito-Reenstierna reaction with its surrounding flare. It was this similarity in appearance of the involved node and the associated positive reaction produced by this intradermal test, a type of reaction generally accepted as a hyperimmune response, that first suggested the possible role of the hyperimmune phenomenon, or destruction of tissue by host reaction, in the clinical characteristics of chancroid. It appeared conceivable that the hyperimmune phenomenon could be essential in the destructive necrotic nature of the penile lesion and the highly inflamed lymph nodes, as well as in the associated positive intradermal reaction.

To test this hypothesis, corticotropin (ACTH) was used in the three cases of chancroid to be presented.

## CASE REPORTS

**Case 1.** A 19-year-old white youth was examined 29 June 1953, because of an ulcer on his penis and bilateral soreness in the groin of one week's duration and enlargement and tenderness of a right inguinal

From U. S. S. General J. C. Breckinridge. Dr. Tyler is now at the Mayo Foundation, Rochester, Minn.



lymph node of three days' duration. Sexual exposures had occurred 7 June 1953 (Japan), 4 June 1953 (Okinawa), and 27 April 1953 (Japan).

On the left side of the penis near the corona was a moderately dirty ulcer with a ragged base and an indurated border. Slight manipulation caused bleeding. A moderately tender lymph node measuring 0.5 to 1 cm in diameter was noted in the left inguinal region. On the right was an extremely tender inguinal lymph node 2 cm in diameter, with an overlying erythematous zone 8 cm in diameter that blanched with pressure.

The penile lesion was slightly worse on the next day; the left node was more tender and the right node now measured 3 to 4 cm in diameter and was exquisitely tender. Rest in bed was instituted.

His condition was essentially the same on 1 July, on which day the Ito-Reenstierna reaction (48 hours) showed a center measuring 1.5 cm in diameter and a 4-cm flare. Results of a Frei test were negative. Artificial autoinoculation on the thigh had resulted in three small, yellow papules with raised erythematous bases about 8 mm in diameter. Between 0900 and 1145 hours on the same day, a total of 80 mg of ACTH was given intravenously in 1,000 ml of a 5 per cent solution of dextrose in distilled water. The flare around the Ito-Reenstierna reaction was almost gone by 1400 hours. The patient noted slight improvement in the right node. At 1700 hours he stated that the pain and tenderness had decreased by half since that morning. The nodes on the left, which now were shotty, were only slightly tender. The erythema had decreased on the right side and the previously exquisitely tender node now was only moderately tender. Another 20 mg of ACTH in 500 ml of solution was given intravenously that evening. The redness over the groin continued to decrease. The Ito-Reenstierna reaction was now extremely faint and was without induration or deep central color.

On 3 July the patient subjectively was worse; the nodes on both sides were larger and moderately tender and were surrounded by slight flares. He stated he had "not quite twice" the pain. His condition having remained unchanged for 36 hours, he was given an intravenous injection of 40 mg of ACTH in 1,000 ml of the same solution between 1100 and 1500 hours on 5 July. By 2100 hours the induration around the nodes had decreased greatly and the patient was much better subjectively. Administration of Terramycin (brand of oxytetracycline), 1 gram four times daily, was begun.

The 40-mg dose of ACTH was repeated on 6 July. By 10 July the penile ulcer was epithelized but the sites of autoinoculation on the thigh still were crusted. One week later the thigh was healed and use of Terramycin was discontinued. The patient was kept under observation to 12 August without evidence of recurrence.

Dark-field examination for *Treponema pallidum* was negative. Smears from the penile lesion stained by Gram's method disclosed many gram

positive cocci and diplococci, some in epithelial cells and some in polymorphonuclear leukocytes. Some of the leukocytes containing these diplococci also contained extremely small gram-negative organisms that were round and about a third the size of small cocci. Some appeared in pairs, whereas some were in extracellular clusters. Two round, gram-negative cocci were seen.

Giemsa's stain revealed bacteria of different sizes in some leukocytes; some of the smaller forms stained violet.

Macchiavello's stain showed the same type of bacteria; some extremely small forms stained red, and a few stained blue. Preparations stained with hematoxylin and eosin disclosed scattered bright-orange bodies about half the size of polymorphonuclear leukocytes. Some of these were in polymorphonuclear leukocytes, whereas some were in large monocytes; none were seen in epithelial cells. In general, smears from the sites of autoinoculation revealed no bacteria or smaller forms; however, rare, small, red cocci were seen in preparations stained by Macchiavello's method.

The buboes of chancroid responded dramatically to ACTH therapy in this case. After the initial response, the lymph nodes again became enlarged and tender but again subsided on further use of ACTH, showing that the initial great improvement was produced by the ACTH. Repeated Ito-Reenstierna tests showed that the positive reactions decreased concomitantly with decrease in size of the buboes, which may be considered evidence that both are intimately associated with a similar response of the hyperimmune type.

Since the clinical course of the disease was only about two weeks, the ACTH apparently did not produce any harmful effect. After receiving 4 grams of Terramycin daily for five days, the patient was clinically cured except for the sites of autoinoculation, which required therapy for seven more days.

**Case 2.** A 22-year-old man, half Hawaiian and half Chinese, was examined on 26 March 1953, because of a sore on his penis and pain in the left inguinal region of one day's duration. The last intercourse had been 10 days before. Examination disclosed a 2-cm lesion on the dorsum of the penis that was red and swollen, with a crusted ulcer 5 mm in diameter in the central part (fig. 1a). Pressure caused about 1 ml of pus to be expressed. Slight tenderness was present in the left inguinal region, but lymph nodes were not palpable. A slight mucoid discharge from the urethra was noted.

A first-glass specimen of urine was loaded with pus cells, whereas a second-glass specimen contained only two or three cells per high-power microscopic field. Results of repeated dark-field examinations were negative. A presumptive Kahn test gave a negative reaction.

stain applied to smears from the lesion disclosed no bacteria. Macchia-vello's stain revealed a few small diplococci, some extracellular and some in leukocytes. A number of red-staining round forms, subbacterial in size, were seen in the cytoplasm of epithelial cells. These varied in size down to organisms just visible microscopically. Results of the Ito-Reenstierna test at 14 hours disclosed a reaction with a 12-mm center and a faint flare. Results of the Frei test were negative. The patient was put at rest in bed.

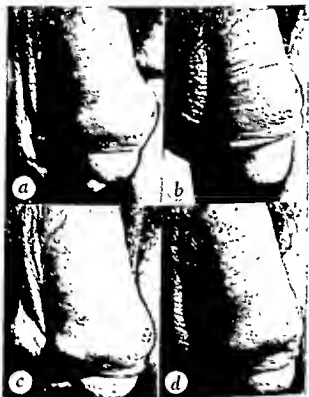


Figure 1 (case 2). Penile lesion. (a) Prior to treatment. (b) Appearance 30 hours after use of corticotropin (ACTH) and rest in bed. This change was evident about 4 hours after the infusion of ACTH was started. (c) Appearance 20 hours after (b), without intervening treatment. This shows that the improvement shown in (b) was probably caused by the ACTH. (d) Appearance after antibiotic therapy and further use of ACTH.

No change was apparent by the next day, so a total of 40 mg of ACTH in 1,000 ml of a 5 per cent solution of dextrose in distilled water was given between 1300 and 1830 hours. By 1700 hours there was great improvement and almost all the edema of the lesion had disappeared. Only a drop of pus could be expressed. The intradermal reaction had faded greatly.

Nine hours later, at 0200 hours, on 28 March, the lesion again was swollen and the intradermal reaction was more red. Therefore, another 40 mg of ACTH was given in the same solution over a four-hour period. A fair additional response was noted. Ice packs were applied thereafter; no significant change had occurred since morning (fig. 1b).

The lesion again became swollen, red, and slightly tender on 29 March (fig. 1c). Pressure caused about 1 ml of pus to exude. From 1400 to 2100 hours the patient received 40 mg of ACTH intravenously. By 1700 hours the Ito-Reenstierna reaction had receded and was not tender (it had been tender prior to the use of ACTH). The edema of the penis had decreased.

On the morning of 30 March the lesion again was swollen. Another intravenous dose of 40 mg of ACTH given as before yielded good improvement. Use of Terramycin in 1.5-gram doses was begun that afternoon. The lesion became slightly more edematous on the following evening, but by the next morning it appeared to be healing (fig. 1d).

The lesion was completely epithelized by 6 April and the patient was prepared for dismissal.

A clear-cut decrease in the destructiveness of the penile lesion followed administration of ACTH in this case; a "flare-up" occurred later, with repetition of the response to additional ACTH therapy. The intradermal reaction showed the same course noted in case 1. Response to use of antibiotics was exceptionally good; 13 grams of Terramycin given in 40 hours proved adequate.

**Case 3.** A 19-year-old white youth was examined on 13 July 1953, because of a sore left groin of eight days' duration. The patient had noted a penile ulcer on 25 June; this lesion was approximately 4 mm in diameter. He had received dihydrostreptomycin daily for seven days, and the lesion apparently had healed after three days. He had had a "chancroid" with soreness of the left groin in January 1953, soreness of the groin again in March 1953, and gonorrhea on 1 June 1953, all of which were treated.

Examination disclosed a matted, flat, moderately tender lymph node in the left inguinal region measuring 2 cm in diameter. An Ito-Reenstierna test resulted in a reaction with a 12-mm center and a flare measuring 3 to 7 cm. A Frei test gave a negative reaction.

The groin still was moderately tender on the next day but some improvement was noted. Administration of Aureomycin (brand of chlor-tetracycline), 1 gram four times daily, was begun.

No change was evident three days later; rest in bed was instituted and use of antibiotics was discontinued. The Ito-Reenstierna reaction still had a red indurated center that was slightly tender. The patient received 40 mg of ACTH given intravenously between 1130 and 1830 hours on this same day, 17 July 1953. By 1900 hours the region of the

intradermal reaction was no longer indurated and tender. The patient stated that 75 per cent of the tenderness in the nodes was gone. The mattedness had decreased.

Examination on 20 July disclosed a slightly tender, firm, left inguinal node measuring 3 to 4 cm in diameter. Administration of Terramycin, 1 gram four times daily, was begun. On 22 July the node was 2 cm in diameter and was moderately tender. On that day he received 40 mg of ACTH given intravenously between 0930 and 1330 hours. By 1400 hours the tenderness was gone and the node was softer and smaller. His condition was essentially the same on 27 July. There was no additional follow-up.

In this case, adenitis associated with a positive Ito-Reenstierna reaction developed or recurred in spite of treatment with dihydrostreptomycin; it also proved resistant to Aureomycin and Terramycin. It was again shown that ACTH can decrease the edema, erythema, and tenderness of buboes, this being demonstrated by an initial favorable response followed by a "flare-up" that again responded to further use of ACTH. The positive Ito-Reenstierna reaction and the clinical appearance varied simultaneously when ACTH was given.

#### DISCUSSION

From the similarity in appearance of the positive Ito-Reenstierna reaction, which generally is accepted as a hyperimmune phenomenon, the destructive necrotic ulcer and the inflamed buboes, and from their concomitant decrease in inflammatory appearance with use of ACTH as noted in these three cases, it would appear that the hyperimmune phenomenon is important in the mechanisms of these various features in chancroid. A hyperimmune reaction similar to that induced by the intradermal test also should be expected at the site of induced autoinoculation; theoretically, those two tests are essentially the same except for the method by which the organisms are introduced and the fact that the site of autoinoculation probably includes live organisms capable of invasion of tissue after the initial reaction.

From a practical standpoint, knowledge of the role of the hyperimmune phenomenon in the clinical features of chancroid might aid in forming a proper rationale for methods of treatment. ACTH at times may be a valuable therapeutic adjuvant, especially when it is particularly desired to prevent excessive destruction of tissue or to make the patient more comfortable. Its over-all role in the treatment of the condition remains to be determined.

Rest in bed has been noted by Canizares and Cohen<sup>4</sup> and by me to be important in decreasing or preventing the formation of buboes. This observation appears to be consistent with the bene-

ficial results of rest in bed in other conditions associated with hyperimmune features, such as rheumatic fever, and this mode of treatment might well have a place in some cases of chancroid.

Stained smears from penile ulcers associated with positive Ito-Reenstierna reactions frequently show gram-positive cocci; some smears suggest the possible presence of subbacterial forms. These findings, based on smears without cultures or further virus studies, might in themselves be disregarded as being evidence of secondary contaminants or errors in interpretation. However, when these findings are considered with various reports of other investigators, one might question the accepted etiologic agent of chancroid.

For at least three decades most investigators have accepted the concept that Ducrey's bacillus could produce chancroid. Greenblatt and Sanderson<sup>2</sup> supplied evidence in support of this conclusion. The question still remains as to whether or not other organisms might cause the same clinical condition. Certainly, lymphogranuloma venereum can simulate chancroid. The possibility that other viruses might be involved at times apparently has not been considered in the experimental work of those who believe that *H. ducreyi* is the only cause of chancroid.

This study shows that clinical features of chancroid such as the necrotic ulcer, the autoinoculability, and the bubo might be explained on the basis of a hyperimmune reaction on the part of the host that theoretically might be brought about by more than one organism. With these clinical features possibly being non-specific in nature, the determination of the cause of chancroid actually depends on the ability to identify the causative organisms by means of smears and cultures and the specificity of the intradermal tests. In some laboratories doing investigative work, organisms morphologically resembling *H. ducreyi* are recognized in smears in only 20 to 60 per cent of diagnosed cases of chancroid;<sup>2, 3, 5</sup> confirmation by means of culture is notoriously unsatisfactory. Smears from the sites of autoinoculation usually are considered to show *H. ducreyi* more frequently;<sup>3</sup> however, lesions resulting from autoinoculation that clinically may show the characteristics of an artificially induced chancroid have been negative for this organism.<sup>6</sup> As for the specificity of the Ito-Reenstierna and the Frei tests, both of these not infrequently show positive reactions in the same case,<sup>7, 8</sup> thus being of little aid in the differentiation of lymphogranuloma venereum and chancroid.<sup>5</sup> I shall present evidence in another study showing that even routine immunization procedures for protection against smallpox, typhus, and cholera probably can influence the results of these tests.

clusively in military personnel.<sup>7-11</sup> This article presents four cases of sickle cell disease encountered over a short period of time in two Air Force hospitals and reviews the clinical features of the sickle cell variants which are helpful in the diagnosis of these conditions.

### SICKLE CELL TRAIT

**Case 1.** An 18-year-old Negro airman was admitted to the 6022d U. S. Air Force Hospital because of fever and malaise.

The patient had been in exceptionally good health all his life. He was asthenic in habitus with somewhat disproportionately long arms and legs, but his history failed to suggest any developmental abnormalities. Several physical examinations, upon induction and during a hospitalization for an upper respiratory infection, were normal.

In January 1955 he developed a penile ulcer. Dark-field examination was reported as negative, and *Hemophilus ducreyi* was identified in smears from the lesion. Therapy consisted of streptomycin sulfate and sulfadiazine; a serologic test for syphilis in March was negative.

On 19 April he developed malaise and fever, and was admitted to the hospital with a diagnosis of acute bronchitis. The acute febrile illness cleared rapidly, but laboratory studies on admission revealed the following: hemoglobin 9.5 g/100 ml; cardiolipin titer positive in a 1:128 dilution. Five days later the hemoglobin was 10.9 g/100 ml; the red blood cell count, 3,440,000/ $\mu$ l, and the hematocrit, 37 ml/100 ml. Reticulocyte counts were 1.0 and 0.6 per cent on two occasions. Repeated stool examinations were negative for blood. A sickling preparation using sodium metabisulfite revealed 75 per cent sickling in six hours; 90 per cent after 24 hours. Slight sclerosis of the inner table of the skull was noted on roentgenographic examination. Electrophoretic analysis of the patient's hemoglobin revealed it to be a mixture of sickle cell and adult hemoglobin (fig. 1); 2.8 per cent of the latter, however, proved to be fetal hemoglobin. Subsequently, the fecal urobilinogen was normal.

The patient was given a course of penicillin. His red blood cell count rose slowly; two months after admission the hemoglobin was 12.5 g/100 ml; the red blood cell count, 4,470,000/ $\mu$ l; and the hematocrit, 40 ml/100 ml. The cardiolipin titer had fallen to 1:16.

**Comment.** The sickle cell trait (sickleemia) is the heterozygous form of sickle cell disease; the erythrocyte contains a mixture of sickle cell and normal adult hemoglobin. Sickle cell hemoglobin constitutes less than 50 per cent of the combination. The trait cells are not sickled on stained smears of blood, but sickling can uniformly be produced by the use of reducing agents, though usually more slowly than in sickle cell anemia. While this abnormality has been associated with the Negro race (8 per cent of American Negroes and up to 46 per cent of some African

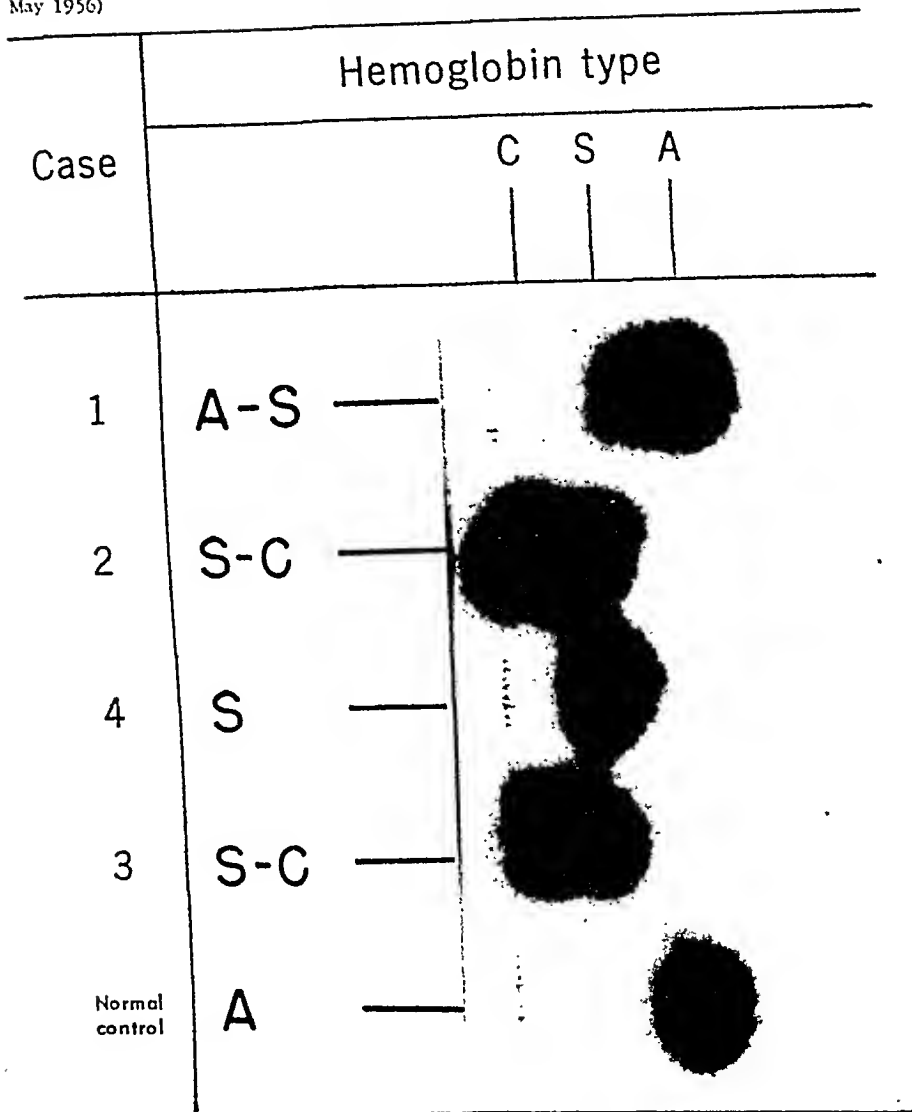


Figure 1. Paper electrophoresis of hemoglobin (performed by the 406th Medical General Laboratory, Tokyo, Japan). The second column lists the hemoglobin abnormality and illustrates the spectrum of abnormalities described. The A hemoglobin is the most rapidly migrating component; C is the slowest. S hemoglobin lies midway between these two.

tribes exhibit it), individuals who are Caucasian by all other criteria have been reported to demonstrate it as well. The highest incidence is seen in persons of Greek and Italian extraction. The question of admixture of Negro blood, interesting to the anthropologist, has no meaning to the clinician; clinically the abnormality is not confined to Negroes.



The sickle cell trait has traditionally been considered as without pathologic significance. Sporadically, however, cases of vascular obstruction by sickled cells in the absence of anemia were reported, involving the brain, lungs, kidneys, spleen, and retina.<sup>11-14</sup> Bauer and Fisher<sup>15</sup> described an instance of abdominal crises in a sicklemic without anemia; however, until the report of Ende, Pizzolato, and Ziskind<sup>16</sup> none of the cases were proved electrophoretically. In three of the four cases reported by the latter group, the presence of the sickle cell trait was confirmed by electrophoresis. Impaction of the sickled cells in blood vessels gave rise to oncephalomalacia and cerebral hemorrhage, priapism, and small bowel infarction. Edington and Lehmann<sup>17</sup> also have described hematuria in an 18-year-old African Negro woman with a proven sickle cell trait and no other apparent cause for the renal bleeding.

The sickle cell trait has been mentioned as exerting an effect under some other circumstances. Weiss and Stecher<sup>18</sup> have found a higher incidence of the trait in patients with tuberculosis and suggest some predisposition to tuberculosis in sicklemics. The response to therapy, however, was not different from that of normal controls.<sup>19</sup> Sickle cell trait cells are also apparently resistant to destruction by *Plasmodium falciparum*;<sup>20,21</sup> the selective advantage this confers in regions endemic for malaria has been advanced to explain the persistence of sickle cell anemia in certain areas. The sickle cell trait has also been shown to predispose to splenic infarction during flight.<sup>22,23</sup>

Although impaction of sickled trait cells in blood vessels may give rise to clinical syndromes mimicking sickle cell anemia, the life span of trait cells is identical to that of normal cells.<sup>24</sup> Aplastic crises, not uncommon in sickle cell anemia, have not been reported in the trait. Consequently, if electrophoretic studies confirm the presence of sicklemia, the presence of anemia should stimulate the clinician to search for other causes of anemia.<sup>25</sup> The case reported above illustrates this feature; a syphilitic infection and acute bronchitis were discovered to be present. In addition, all associated evidences of a hemolytic process were absent (hyperbilirubinemia, reticulocytosis, increased fecal urobilinogen). While depression of the bone marrow by acute infections of this type is rare, the spontaneous improvement seen after therapy of the infection suggests a causal relationship to the anemia.

#### SICKLE CELL-H

deformity had resulted. Physical examination revealed some puffiness of the eyelids and a firm spleen, palpable one and one half fingers-breadth below the costal margin.

Laboratory studies on admission were as follows: hemoglobin, 11.2 g/100 ml; hematocrit, 38 ml/100 ml; serum bilirubin, 1.14 and 0.8 mg/100 ml. Specific gravity of the urine was low and remained so for the entire hospital course. Frequent target cells were present in blood smears; the red cells began hemolysis at 0.36 per cent saline and were completely hemolyzed at 0.22 per cent. After several negative tests for sickling, repeated tests revealed 40 per cent sickling in 24 hours. Except for a phenolsulfonphthalein excretion of 47 per cent in two hours, all tests of renal functions were normal. The reticulocyte count was elevated (maximum of 4.4 per cent) on several examinations; the fecal urobilinogen was 232 Ehrlich units per 100 g of feces. Additional blood counts during the hospital course were as follows: hemoglobin, 11.2 g/100 ml; red blood cell count, 3,950,000/ $\mu$ l; hematocrit 38 ml/100 ml. Examination of bone marrow revealed normoblastic activity. Roentgenograms of bone were normal.

Electrophoretic study of the hemoglobin demonstrated it to be a combination of sickle cell and C hemoglobins in a proportion of 38 to 62. Fetal hemoglobin was 1.5 per cent (fig. 1).

Studies performed at Letterman General Hospital revealed, in addition, a red cell survival time of 40 days by the radioactive chromium method.

**Case 3.** A 19-year-old Negro airman entered the 6022d U. S. Air Force Hospital complaining of severe left upper-quadrant and left flank pain of three days' duration. The onset was abrupt, beginning on an airplane flight and persisted until he was admitted to the hospital. Arm and leg pain had been noted by the patient since the age of 12 years. He had been hospitalized in Korea several months previously for obscure leg pains but denied any jaundice, anemia, or abdominal pain. Both parents and four siblings were alive and well.

The patient was a tall, thin man with somewhat disproportionately elongated extremities, complaining of left upper-quadrant and left flank pain. Tenderness and rigidity were present in these areas. Fever was low grade. The liver was enlarged to 2 cm below the right costal margin. The spleen could not be felt but muscle guarding made palpation difficult.

The white blood cell count was elevated. The hemoglobin was 14.2 g/100 ml; the hematocrit 47 ml/100 ml; the sedimentation rate 4 mm per hour. About 44 per cent of the red cells on stained smear were target cells. The routine moist preparation failed to demonstrate sickling but with the use of stasis or sodium metabisulfite (2 per cent) there was 75 per cent immediate sickling (fig. 2). The osmotic fragility of the red cells was decreased, hemolysis beginning at 0.35 per cent and com-

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#### SICKLE CELL-HEMOGLOBIN C DISEASE

**Case 2.** A 20-year-old Negro airman was transferred to the 6407th U. S. Air Force Hospital for investigation of anemia. He had experienced recurrent attacks of joint pains since childhood. During these, swelling and tenderness of the joints had been present, but no residual

deformity had resulted. Physical examination revealed some puffiness of the eyelids and a firm spleen, palpable one and one half fingers-breadth below the costal margin.

Laboratory studies on admission were as follows: hemoglobin, 11.2 g/100 ml; hematocrit, 38 ml/100 ml; serum bilirubin, 1.14 and 0.8 mg/100 ml. Specific gravity of the urine was low and remained so for the entire hospital course. Frequent target cells were present in blood smears; the red cells began hemolysis at 0.36 per cent saline and were completely hemolyzed at 0.22 per cent. After several negative tests for sickling, repeated tests revealed 40 per cent sickling in 24 hours. Except for a phenolsulfonphthalein excretion of 47 per cent in two hours, all tests of renal functions were normal. The reticulocyte count was elevated (maximum of 4.4 per cent) on several examinations; the fecal urobilinogen was 232 Ehrlich units per 100 g of feces. Additional blood counts during the hospital course were as follows: hemoglobin, 11.2 g/100 ml; red blood cell count, 3,950,000/ $\mu$ l; hematocrit 38 ml/100 ml. Examination of bone marrow revealed normoblastic activity. Roentgenograms of bone were normal.

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**Case 3.** A 19-year-old Negro airman entered the 6022d U. S. Air Force Hospital complaining of severe left upper-quadrant and left flank pain of three days' duration. The onset was abrupt, beginning on an airplane flight and persisted until he was admitted to the hospital. Arm and leg pain had been noted by the patient since the age of 12 years. He had been hospitalized in Korea several months previously for obscure leg pains but denied any jaundice, anemia, or abdominal pain. Both parents and four siblings were alive and well.

The patient was a tall, thin man with somewhat disproportionately elongated extremities, complaining of left upper-quadrant and left flank pain. Tenderness and rigidity were present in these areas. Fever was low grade. The liver was enlarged to 2 cm below the right costal margin. The spleen could not be felt but muscle guarding made palpation difficult.

The white blood cell count was elevated. The hemoglobin was 14.2 g/100 ml; the hematocrit 47 ml/100 ml; the sedimentation rate 4 mm per hour. About 44 per cent of the red cells on stained smear were target cells. The routine moist preparation failed to demonstrate sickling but with the use of stasis or sodium metabisulfite (2 per cent) there was 75 per cent immediate sickling (fig. 2). The osmotic fragility of the red cells was decreased, hemolysis beginning at 0.35 per cent and com-

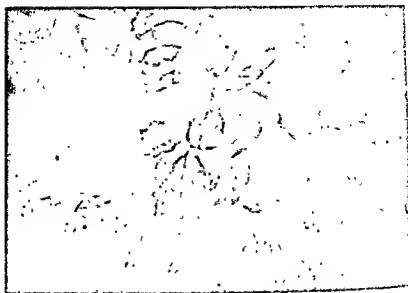


Figure 2 (case 3). Photomicrograph of an unstained moist preparation of the patient's sickled cells (2 per cent metabisulfite).

plete at 0.05 per cent. (Control values were 0.50 and 0.35 per cent respectively.) Reticulocyte counts were 1.5 and 0.7 per cent on two occasions. Some hematuria and albuminuria were present on admission but cleared rapidly. The urine was completely normal thereafter. The serum bilirubin was normal; the thymol turbidity was persistently elevated. The cephalin flocculation, normal on admission, became elevated some months after the acute episode. The fecal urobilinogen was 267 Ehrlich units per 100 g of feces (normal: 80-250). There was no bromsulfalein (brand of sulfobromophthalein sodium) retention.

Roentgenograms showed elevation of the left dome of the diaphragm and an enlarged splenic shadow; those of bone revealed osteoporosis of the shafts of some long bones. Dental roentgenograms were interpreted as demonstrating osteoporosis of the mandible and maxilla.

The patient's temperature rose to a maximum by the second hospital day and remained elevated for four days. Abdominal pain and rigidity were present for a similar period. Thereafter, fever and abdominal pain subsided slowly. Repeat roentgenograms showed recession of the previously enlarged spleen, though even when abdominal rigidity disappeared the spleen was never palpable. The blood count remained at the same level throughout the hospitalization. The patient was returned to duty; however, further flying was contraindicated.

Approximately two months later, the patient returned with priapism. When other measures, including spinal anesthesia failed, irrigation of

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the corpora cavernosa with streptokinase and streptodornase resulted in loss of the erection. This has not recurred.

Electrophoretic study of the patient's hemoglobin by both filter paper and moving boundary methods revealed it to be a combination of sickle cell and C hemoglobin in a proportion of 37 to 63 per cent respectively (fig. 1).

**Comment.** Enough information based on several series<sup>28-30</sup> has been published to establish the fact that the combination of sickle cell and C hemoglobin (sickle cell hemoglobin constituting 30 to 50 per cent of the mixture) results in a disease with fairly distinctive clinical and hematologic features. One of the most striking of these is the patients' relatively late age at onset of symptoms, especially in comparison with those having sickle cell anemia. Half of the patients reported first note symptoms after 10 years of age; some have lived to advanced ages without complaints. Abdominal pain occurs in only one fifth of the patients; bone pain and/or arthralgias are present in roughly 70 per cent. These pains range from mild and transient to severe and persistent, but the episodes are infrequent. Hemolytic crises occur infrequently, though severe ones with marked falls in hemoglobin levels have been reported. Central nervous system manifestations (convulsions and subarachnoid bleeding) have been seen in a few patients. Smith and Conley<sup>28</sup> have commented on the frequency of aseptic necrosis of bone in patients with this disease. These authors also suggest that severe hemolytic crises associated with pregnancy occur frequently in this variant, more so than in sickle cell anemia.

Splenic enlargement is encountered in 65 per cent of cases. In three reported patients, prolonged follow-up revealed that a previously palpable spleen receded to normal size. This recession is probably on the basis of small infarctions with fibrosis; the meager pathologic information available substantiates this.<sup>28</sup> Intra-ocular hemorrhages were noted in four cases. While gross hematuria has been seen occasionally, the incidence of microscopic hematuria cannot be ascertained.

The outstanding hematologic abnormality of this disease is the presence of large numbers of target cells<sup>31</sup> (figs. 3 and 4). With few exceptions, these exceed 50 per cent in the stained smear, and have reached 85 per cent. As a consequence, the osmotic fragility of the red blood cells is decreased, often markedly. Sickling is seldom present on the stained smear, but is usually seen in moist preparations. As the life span of the red blood cell in sickle cell-hemoglobin C disease is shorter than normal, anemia is the rule. However, this is seldom severe. In about 25 per cent of cases, normal counts are noted at some time. Some patients are never anemic, indicating that the bone



*Figure 3 (case 3). Patient's cells stained with Wright's stain, illustrating the large number of target cells found in sickle cell-hemoglobin C disease.*



*Figure 4 (case 3). Patient's cells unstained, illustrating the central bump of the leptocyte that gives it the typical "target" configuration.*

marrow can compensate for the degree of hemolysis. The anemia, when present, is invariably normochromic, but may be either normocytic or microcytic. While reticulocyte levels of up to 30 per cent have been reported, they seldom exceed six per cent and are usually normal at some time in the course of the disease.

Bone marrow aspirations, when done, uniformly reveal erythroid hyperplasia.

Radiologically, bone changes in sickle cell-hemoglobin C disease are mild in comparison to sickle cell anemia. Only a few patients demonstrate sclerotic areas in the long bones. Slight osteoporosis has also been seen. Areas of radiolucency in the mandible and maxilla, with coarsening of trabeculae, are seen in sickle cell-hemoglobin C disease.<sup>28</sup>

Acute splenic infarction occurring during air travel is a dramatic complication of sickle cell disease. Though approximately 30 patients with this complication have been either reported or mentioned in the literature, only 22 have had electrophoretic studies of their hemoglobin. Smith and Conley<sup>24</sup> analyzed the hemoglobin of 15 patients, 11 of whom proved to have the sickle cell trait. Two had sickle cell-hemoglobin C disease and another had probable sickle cell-thalassemia disease. Motulsky and associates,<sup>25</sup> in a series of six examples of this complication, found two to be sickle cell-hemoglobin C disease; one to be sickle cell-thalassemia; and three to be sickle cell traits. Our patient proved to have sickle cell-hemoglobin C disease. Smith and Conley<sup>24</sup> pointed out that the infarctions occurred at lower altitudes on shorter flights in patients with sickle cell-hemoglobin C disease. Furthermore, the frequent finding of sickle cell-hemoglobin C disease in contrast to the rarity of this variant suggests that these individuals are especially susceptible to decreased oxygen tension.

Fixation of the specific gravity and inability to concentrate the urine, while not previously reported in sickle cell-hemoglobin C disease, often has been noted in sickle cell anemia. Since the pathologic findings in both of these conditions are quite similar, except that complications usually occur over a longer period in sickle cell-hemoglobin C disease, it is likely that almost all abnormalities seen in the parent disease will eventually be reported in the variant. Little is known of the reason for this impairment of concentrating power; Kunz and associates<sup>32</sup> confirmed its presence in 15 cases of sickle cell anemia. They ruled out abnormal secretion of antidiuretic hormone as a cause of this failure, localizing the defect to the renal tubules. Hemolysis or repeated, clinically inapparent renal vascular occlusion was suggested as the basis of the defect.

Abnormalities of liver function are also rare in the reported cases of sickle cell-hemoglobin C disease, though not uncommon in sickle cell anemia. Bauer<sup>33</sup> has described vacuolization, fatty change, and necrosis of liver cells in an autopsied case of sickle cell anemia, presumably on the basis of anoxia. Hepatomegaly and the later development of abnormalities of the thymol tur-



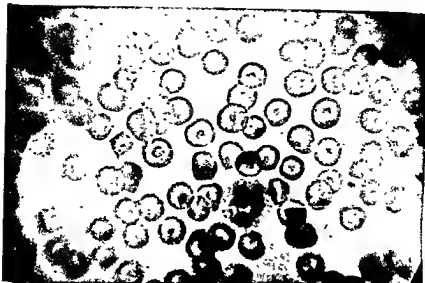


Figure 3 (case 3). Patient's cells stained with Wright's stain, illustrating the large number of target cells found in sickle cell-hemoglobin C disease.

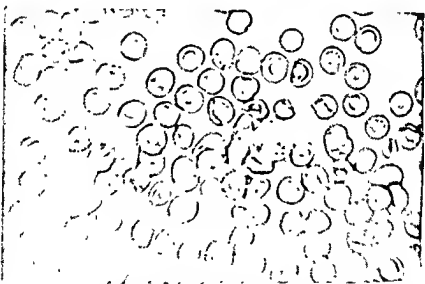


Figure 4 (case 3). Patient's cells unstained, illustrating the central hump of the leptocyte that gives it the typical "target" configuration.

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bidity and cephalin flocculation in case 3 suggest a similar series of events.

### SICKLE CELL ANEMIA

**Case 4.** An 18-year-old Negro corporal was transferred to the 6407th U. S. Air Force Hospital for investigation of anemia. He had been admitted to another hospital for pneumonia; at that time marked sickling of the red cells, a hematocrit of 32 g/100 ml, and a reticulocytosis of 3 per cent had been noted. In addition, the serum bilirubin had been 2.3 and 1.5 mg/100 ml on two determinations.

Five years previously, the patient had been jaundiced and was told that his liver was enlarged. At that time also, he was given several transfusions. He had also noted occasional pains in the knees and extremities, but had never developed ulcerations of his legs. Physical examination revealed the patient to appear younger than his stated age, and small in stature. There was minimal scleral icterus. The heart was not enlarged nor were any organs palpable in the abdomen.

Laboratory data was as follows: hemoglobin, 9 g/100 ml; red blood cell count, 3,200,000/ $\mu$ l; hematocrit, 32 ml/100 ml; white blood cell count and differential, normal. The serum bilirubin was 1.5 mg/100 ml; the cephalin flocculation was 4 plus; and the bromsulfalein retention was 7 per cent in 45 minutes. Reticulocyte counts were elevated, the maximum being 3.7 per cent. The red cell fragility to saline was decreased. One week after admission, the serum bilirubin rose to 3.46 mg/100 ml, 3.31 mg/100 ml being in the indirect fraction, and concomitantly the hemoglobin was 8.7 g/100 ml and the red blood cell count 3,290,000/ $\mu$ l. Ten days later the serum bilirubin had returned to the initial value; several additional determinations were within the normal range. The blood count maintained its initial level. The electrocardiogram and roentgenograms of bone were normal; however, the urine specific gravity remained at 1.010 on several casual specimens and after a concentration test.

Electrophoretic study of the patient's hemoglobin revealed it to consist entirely of sickle cell hemoglobin (fig. 1). Because of the uncertain prognosis, he was transferred to the zone of the interior for further evaluation.

**Comment.** Since several complete reviews of sickle cell anemia have been published recently<sup>24,25</sup> the diverse and protean signs and symptoms will not be discussed here. However, one recent article deserves special attention. Edington and Lehmann<sup>26</sup> published a report of two African Negroes with normal blood counts, including reticulocyte counts, in whom electrophoresis revealed only sickle cell hemoglobin. Both patients gave histories of joint pains in childhood but both were in prolonged remission at the time of blood analysis. Hemoglobin solubility tests<sup>27</sup> further supported that sickle cell anemia was involved. The possibility,

then, that sickle cell anemia may be a benign condition in some individuals, and that as yet undiscovered factors are responsible for the severity of clinical manifestations, must be considered. While the patient presented above is neither asymptomatic nor hematologically normal, his is an unusually benign form of sickle cell anemia. The possibility that others with similar benign conditions or in asymptomatic remissions may be inducted into the armed services again points up the importance of electrophoresis in the precise diagnosis of sickle cell disease.

#### OTHER VARIANTS OF SICKLE CELL DISEASE

While no examples of sickle cell thalassemia (microdrepanocytic disease) were diagnosed during the period of this study, some cases of this abnormality have been reported in individuals in perfect health, and therefore eligible for induction into military service. Accordingly some of the clinical, hematologic, and electrophoretic features of this disease will be reviewed. Silvestroni and Bianco,<sup>37</sup> in reporting 35 cases, emphasized the variability in severity of the disease and the age of onset of symptoms, though usually the disease is a severe one. Only two of their patients were adults; about half developed symptoms in early childhood and only two were asymptomatic and normal on physical examination at the ages of six and seven, respectively.

Pallor and jaundice are frequent, though jaundice is usually mild. Approximately one third of patients complain of bone and joint pains; when these occur they are often severe, last several days, and are accompanied by fever. Abdominal pain is very frequent, often in the left upper quadrant (suggesting small splenic infarcts) or lumbar (suggesting mild hemoglobinuric nephrosis). Hepatomegaly is frequent but usually moderate; splenomegaly is equally frequent but may be massive. A situation analogous to the autosplenectomy of sickle cell anemia may occur; a previously enlarged spleen may become small and fibrotic. Depending on the degree of anemia, cardiac enlargement and murmurs may occur.

Hematologically the anemia is moderate, the red blood cell count rarely being under 3,000,000 per microliter. The color index is always low (a mean of 0.75); the anemia is microcytic (the mean corpuscular volume and mean corpuscular hemoglobin are uniformly low). Nucleated red cells are rarely present but leukocytosis is frequent. The stained smears typically reveal anisocytosis, poikilocytosis, hypochromia, numerous target cells, elliptocytes, anisochromia, pigmented red cells, and numerous sickled cells. Singer, Singer, and Goldberg<sup>38</sup> reported three cases with additional hematologic data: Reticulocytes varied from 2.8 to 8.67 per cent; osmotic fragility was uniformly decreased; target cells ranged from 12 to 51 per cent. One of the patients

in the latter report was perfectly well at the time of diagnosis and without physical findings; the hemoglobin was 12.3 g/100 ml and the red blood cell count 4,100,000/ $\mu$ l.

The electrophoretic diagnosis of sickle cell-thalassemic disease is somewhat more complex than the other sickle cell diseases and depends on the relative quantity of S hemoglobin. In the sickle cell trait, the amount of S hemoglobin is 25 to 45 per cent; never over 50 per cent. In sickle cell-hemoglobin C disease, it is about 50 per cent. In sickle cell anemia, S hemoglobin constitutes usually 85 per cent of the combination, fetal hemoglobin providing the remainder. In microdrepanocytic disease, sickle cell hemoglobin makes up 65 to 80 per cent of the combination. Electrophoretic analysis of the hemoglobin in sickle cell-thalassemia disease reveals it to consist of a combination of sickle cell, adult, and fetal hemoglobins, the quantity (65 per cent) of S hemoglobin distinguishing it from the trait and the presence of sizeable amounts of normal adult hemoglobin differentiating it from sickle cell anemia. For this to be valid, however, recent transfusions of normal hemoglobin into a patient with sickle cell anemia must be ruled out.

In addition, Sturgeon, Itano, and Bergren<sup>11</sup> alluded to a case of sickle cell-thalassemia disease without demonstrable adult hemoglobin, but details are not available. Family studies or use of solubilities of hemoglobin<sup>12</sup> may be required for a final determination in such cases.

Hemoglobin D is a rare abnormal hemoglobin, thus far identified in only two white families.<sup>13,14</sup> Strangely enough, two members of one family had combinations of sickle cell and D hemoglobin. D hemoglobin is indistinguishable from sickle cell hemoglobin in electrophoretic mobility but differs from it in that it does not cause sickling. The electrophoretic pattern in sickle cell-hemoglobin D disease is identical to that of sickle cell anemia; differentiation requires that one parent have an electrophoretic pattern identical with that of S hemoglobin without manifesting sickling. In addition, the S-D mixture is considerably more soluble in 2.24 M phosphate solutions.<sup>15</sup>

The two known cases, siblings, were markedly different clinically. Though one was incapacitated by frequent crises, the other was clinically well. In the latter, joint pains and anemia were present prior to the age of 10 but since receded. Both patients had moderate anemia, reticulocytosis (7 to 8 per cent), slight leptocytosis (2 to 7 per cent), and normal red blood cell fragility.

Occurrence of sickle cell-congenital hemolytic icterus has been alluded to in one report;<sup>16</sup> clinical details are unknown.

## SUMMARY

Sickle cell disease is the term applied to the clinical conditions resulting from the presence of an abnormal hemoglobin (sickle cell hemoglobin) in the erythrocyte. This abnormal hemoglobin may exist alone (sickle cell anemia) or in combination with other normal or abnormal hemoglobins. The resulting disease may have distinctive clinical hematologic features; it may be mild or severe. The factors determining clinical severity are not known. Mild cases may live to military age and be inducted into the armed services. In some instances, such individuals may be capable of full duty; in others complications may arise that lead to severe illness. As the service physician may be called on to diagnose and treat these entities and as the clinical syndromes may often be bizarre, several examples of sickle cell disease are presented and their clinical features reviewed. The electrophoresis of hemoglobin will usually enable a conclusive diagnosis of the underlying hemoglobin abnormality to be made; determination of the percentage of fetal hemoglobin by the alkali denaturation method may be essential in certain circumstances. Rarely, additional procedures (determination of hemoglobin solubility and family studies) are required.

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# PULP REACTION TO ULTRASONIC CAVITY PREPARATION

## Preliminary Report

HARRY J. HEALEY, *Commander, DC, USNR*

SAMUEL S. PATTERSON, *D. D. S.*

GRANT VAN HUYSEN, *D. D. S.*

**W**ITHIN the last few years the dental profession has been offered a variety of instruments for the purpose of preparing cavities. The operative dentist is constantly striving to obtain an instrument that will fulfill all of the rigid requirements of cavity preparation, and that can be manipulated quickly and still be precise, noiseless, painless to the patient, nonthermogenic to the tooth, and nontraumatic to the pulp and periapical tissue. To date, no one instrument will fulfill all of these requirements.

Several investigators have suggested the use of instruments utilizing high-frequency vibrations,<sup>1-4</sup> and the profession has recently been offered an ultrasonic instrument for appraisal and consideration. A most important question concerning this instrument is "What is the effect upon the pulp when cutting a cavity with a high-frequency, vibrational instrument?" Neilsen<sup>5</sup> has shown that his instrument will cause injury to the enamel organ if used for cutting cavities in persistently growing incisor teeth of the guinea pig. The purpose of the present study is to compare the histologic appearance of pulps in young human teeth in which cavities were prepared with the steel bur, the diamond stone, and the ultrasonic cutting instrument.

## METHOD

Noncarious maxillary and mandibular premolar teeth which were scheduled for removal for orthodontic purposes had cavities prepared in them using either a steel bur, a diamond stone, or the ultrasonic instrument.\* The steel burs and diamond stones were operated under a stream of water. The cutting of the tooth with the ultrasonic instrument was accomplished with a blunt steel

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From Indiana University School of Dentistry, Indianapolis, Ind.

\*The Cavitron, purchased from the Cavitron Equipment Corp., Long Island City, N. Y.



tool having 1/16-inch square working surface and operating at 20,000 vibrations per second in an aqueous slurry of aluminum oxide.

These teeth were then restored with a calcium hydroxide base covered with zinc oxyphosphate cement or amalgam restorations. During the postoperative period no manifestations of unfavorable symptoms such as constant pain or temporary hypersensitivity were observed in any of the teeth. One to two months after being prepared and restored, the teeth were extracted using local anesthesia. The teeth were placed in 10 per cent formalin after the roots were amputated so that the fixative could more readily permeate the pulp tissue.

### OBSERVATIONS

The distance between the cavity floor and the pulp (table 1) was measured along the shortest dentinal tubule between the cavity floor and the pulp. Figure 1 shows a photomicrograph of

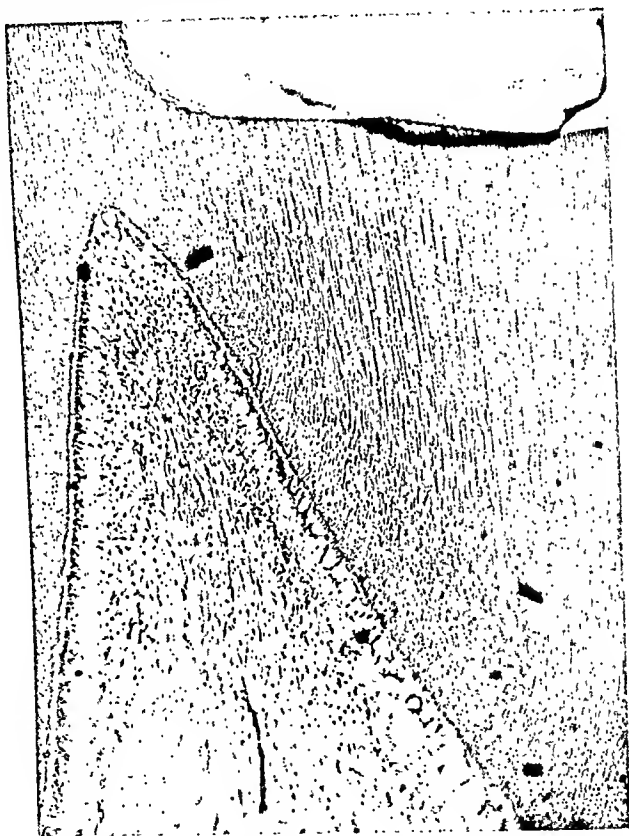
TABLE 1.

Specimen number*	Tooth	Age of patient	Date of operation (1955)	Cutting tool	Date of extraction (1955)	Distance (from cavity floor to pulp)
1	<u>4</u> /	10	1-24	Ultrasonic	2-14	1.55 mm
2	<u>14</u>	10	1-24	Diamond 558: H <sub>2</sub> O	2-14	1.0 mm
3	<u>4</u> /	10	2-14	Ultrasonic	4-15	0.2 mm
4	<u>14</u>	10	2-14	37 inv. cone: H <sub>2</sub> O	4-21	0.25 mm
5	<u>14</u>	16	2-14	Ultrasonic	4-15	1.5 mm
6	<u>4</u> /	13	1-14	Bar + H <sub>2</sub> O	3-11	2.5 mm
7	<u>4</u> /	13	1-14	Steel bur: H <sub>2</sub> O	3-11	1.2 mm
8	<u>14</u>	13	1-14	Ultrasonic	3-18	0.2 mm
9	<u>14</u>	13	1-14	Ultrasonic	3-18	2.5 mm
10	<u>4</u> /	16	2-14	Ultrasonic	4-28	exposure
11	<u>14</u>	10	2-24	Ultrasonic	3-24	1.00 mm
12*	<u>14</u>	13	12-10 (1953)	Steel bar	1-24	2.00 mm

\*In all cases except No. 12, the filling base was calcium hydroxide and the filling material was cement. In case 12 no filling base was used, and amalgam was the filling material.

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the tooth and pulp listed as number 3 in the table. The cavity floor is 0.2 mm from the pulp at the point where the shortest dentinal tubule connects the two. There is an intact line of predentin around the periphery of the pulp, even in the area approximating the dentinal tubules severed by the cavity. It is uniformly thick and shows calcospherites, demonstrating normal calcification of this predentin. The illustration on the right hand margin of the pulp shows vacuolization of the odontoblastic layer. This is assumed to be artefact. There is no hyperemia or leukocytic infiltration in any area of the pulp.



*Figure 1. The cavity floor to pulp distance is 0.2 mm, with no pulp reaction. The cavity was prepared with the ultrasonic instrument and restored with calcium hydroxide and cement. ( $\times 250$ )*

Figure 2 shows a photomicrograph of specimen 8 (table 1). This cavity was also cut with the ultrasonic device. The floor of the cavity is 0.2 mm from the nearest part of the pulp. The cavity was restored with calcium hydroxide and cement. The tooth was extracted two months after the restoration had been placed. There

tool having 1/16-inch square working surface and operating at 29,000 vibrations per second in an aqueous slurry of aluminum oxide.

These teeth were then restored with a calcium hydroxide base covered with zinc oxyphosphate cement or amalgam restorations. During the postoperative period no manifestations of unfavorable symptoms such as constant pain or temporary hypersensitivity were observed in any of the teeth. One to two months after being prepared and restored, the teeth were extracted using local anesthesia. The teeth were placed in 10 per cent formalin after the roots were amputated so that the fixative could more readily permeate the pulp tissue.

### OBSERVATIONS

The distance between the cavity floor and the pulp (table 1) was measured along the shortest dentinal tubule between the cavity floor and the pulp. Figure 1 shows a photomicrograph of

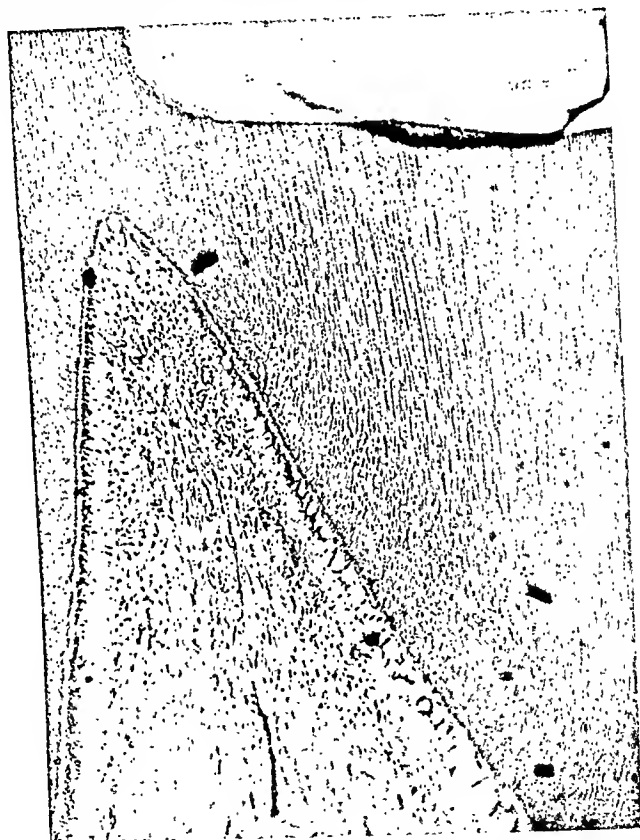
TABLE 1.

Specimen number*	Tooth	Age of patient	Date of operation (1955)	Cutting tool	Date of extraction (1955)	Distance from cavity floor to pulp
1	$\frac{4}{\bar{4}}$	10	1-24	Ultrasonic	2-14	1.55 mm
2	$\frac{1}{\bar{4}}$	10	1-24	Diamond 558: H <sub>2</sub> O	2-14	1.0 mm
3	$\frac{4}{\bar{4}}$	10	2-14	Ultrasonic	4-15	0.2 mm
4	$\frac{1}{\bar{4}}$	10	2-14	37 inv. cone: H <sub>2</sub> O	4-21	0.25 mm
5	$\frac{1}{\bar{4}}$	16	2-14	Ultrasonic	4-15	1.3 mm
6	$\frac{4}{\bar{4}}$	13	1-14	Bur + H <sub>2</sub> O	3-11	2.5 mm
7	$\frac{4}{\bar{4}}$	13	1-14	Steel bur: H <sub>2</sub> O	3-11	1.2 mm
8	$\frac{1}{\bar{4}}$	13	1-14	Ultrasonic	3-18	0.2 mm
9	$\frac{1}{\bar{4}}$	13	1-14	Ultrasonic	3-18	2.5 mm
10	$\frac{4}{\bar{4}}$	16	2-24	Ultrasonic	4-28	exposure
11	$\frac{1}{\bar{4}}$	10	2-24	Ultrasonic	3-24	1.00 mm
12*	$\frac{1}{\bar{4}}$	13	12-10 (1953)	Steel bur	1-24	2.00 mm

\*In all cases except No. 12, the filling base was calcium hydroxide and the filling material was cement. In case 12 no filling base was used, and amalgam was the filling material.

May 1956)

the tooth and pulp listed as number 3 in the table. The cavity floor is 0.2 mm from the pulp at the point where the shortest dentinal tubule connects the two. There is an intact line of predentin around the periphery of the pulp, even in the area approximating the dentinal tubules severed by the cavity. It is uniformly thick and shows calcospherites, demonstrating normal calcification of this predentin. The illustration on the right hand margin of the pulp shows vacuolization of the odontoblastic layer. This is assumed to be artefact. There is no hyperemia or leukocytic infiltration in any area of the pulp.



*Figure 1. The cavity floor to pulp distance is 0.2 mm, with no pulp reaction. The cavity was prepared with the ultrasonic instrument and restored with calcium hydroxide and cement. ( $\times 250$ )*

Figure 2 shows a photomicrograph of specimen 8 (table 1). This cavity was also cut with the ultrasonic device. The floor of the cavity is 0.2 mm from the nearest part of the pulp. The cavity was restored with calcium hydroxide and cement. The tooth was extracted two months after the restoration had been placed. There

is no evidence of inflammation in the pulp. However, it shows two areas "x" of thickened predentin over the coronal apex and along the right side, opposite the cavity floor. There is little or no increase in thickness of the predentin layer in the zone "y" intermediate to these two thickened areas. The odontoblastic layer approximating the thickened predentin layers is slightly disturbed.

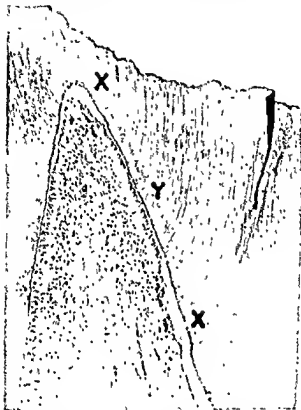
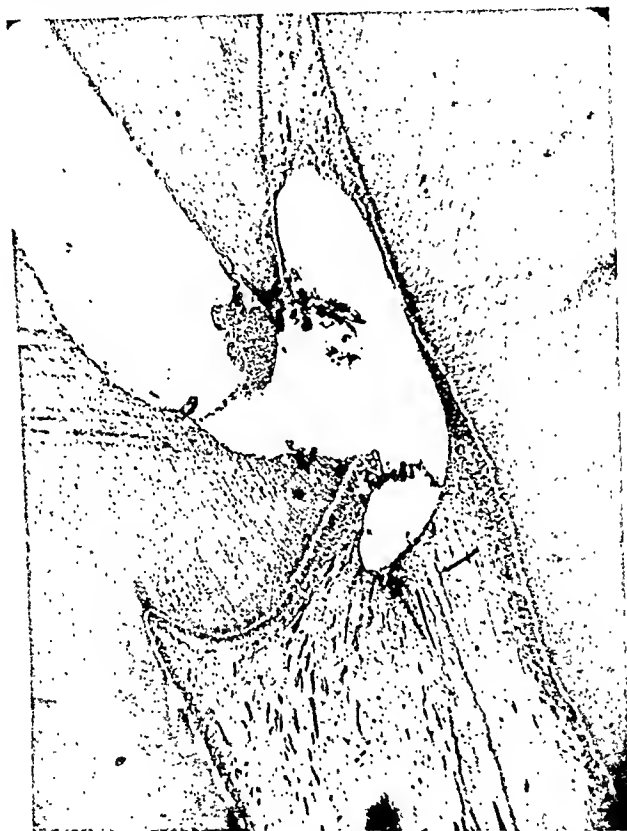


Figure 2. The cavity floor cut with the Cavitron instrument is 0.2 mm from the nearest part of the pulp. The cavity was restored with calcium hydroxide and cement. It shows two areas of secondary dentin "x" over coronal apex and along right side of section. ( $\times 250$ )

Figure 3 (specimen 10) shows a pulp exposure made with the ultrasonic instrument. The exposure was capped with calcium hydroxide covered with cement. There is no evidence of pulpal inflammation. The large vacuol is assumed to be artifact. In this pulp exposure there was no evidence of an attempt upon the part of the pulp to bridge the exposure with predentin.

Figure 4 shows a photomicrograph of a premolar pulp from a 15-year-old boy. This tooth had been removed for orthodontic reasons 13 months after being restored with a shallow occlusal amalgam restoration. The cavity preparation was made with a steel bur. Figure 4 shows the histologic section of the decalcified tooth. Although the enamel was lost during processing of the tooth for this section, it is obvious that the occlusal cavity was



*Figure 3. Pulp exposure made by ultrasonic instrument and treated with calcium hydroxide and cement. No pulpitis. ( $\times 250$ )*

a shallow one and the supposedly nonirritating amalgam restorative material was placed at a relatively great distance from the pulp. Just as in figure 2, there is histologic evidence of favorable pulp reaction in two areas. These are indicated at "x" in figures 2 and 4B. Pulp tissue "y" in these two figures located between and on each side of these areas was not affected, yet the dentinal tubules leading to the unaffected pulp periphery were cut during cavity preparation.



Figure 4. Magnifications of beaded pulp injury following shallow cavity preparation with a steel bar and amalgam restoration without a base. The tooth was removed 13 months after filling had been placed. A: (x 75); B: (x 250); C: (See page 691.)

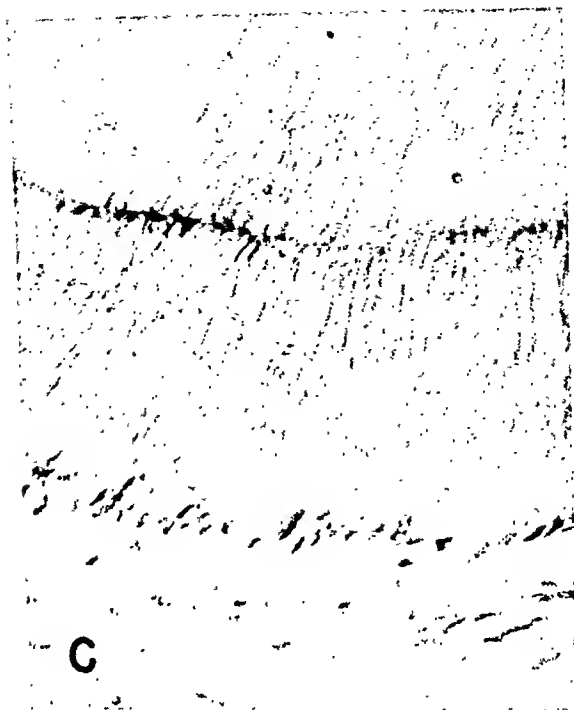


Figure 4C: ( $\times 500$ ) (See page 690.)

There is no way of proving what caused this pulp reparative reaction. It occurs in carious and noncarious teeth. The reaction occurs regardless of the instrument used or the restorative material placed. The reaction also occurs under shallow or deep restorations. As far as can be determined, the reparative reaction is associated with the cutting of dentin and takes at least a month to become visible histologically. The teeth indicated in the table as numbers 3, 4, 5, 8, and 12 showed evidence of irregular dentin approximating the cut tubules. Teeth numbered 6, 7, and 9 did not show irregular dentin formation although all of these teeth were removed two months after having been prepared and restored. Why the reaction does not take place in the pulp approximating all cut tubules cannot be explained by this investigation. It should be pointed out that this type of reaction also occurs in response to attrition and caries. It is therefore not a response to the restorative material.

The teeth used in this study were fully erupted and their apices completely formed. However, the apical tissues of the teeth were cut off and discarded so that better fixation of the pulp could be obtained. Consequently, it was impossible in this study to determine the effect of ultrasonic cavity preparation upon tooth formation.



## CONCLUSIONS

On the basis of histologic and clinical evidence, no unfavorable pulpal reaction resulted from the use of an ultrasonic cutting instrument for the preparation of cavities in the teeth used in this study.

The reactions of the pulp to the use of the steel bur, the diamond stone, and the ultrasonic instrument for cavity preparation as observed in this study were markedly similar. The observed pulpal reaction to cavity preparation instrumentation is not correlated with cavity depth.

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## HOW SIGNIFICANT IS "SIGNIFICANT"?

"The viewpoint that one should pay no attention to the data until a probability of 19 to 1 is attained is altogether unsuited to the doctor's work. Many diagnoses must be made without the confidence that they will be correct 19 times out of 20; many forms of therapy should be initiated when the chances of success are far less than 19 to 1. Often it would be ridiculous to wait until the odds reached "significant" values before acting. While the doctor's common sense will keep him out of trouble in such matters, one wonders whether a lower level of "significance" would not be more appropriate to many medical problems. Most of us would think we were doing well if our accuracy in medical matters approached a probability of 9 to 1. A patient would be glad to undergo any therapy with a 9 to 1 chance of success, nay, even if the odds were only 2 to 1."

—ISAAC STARR, M. D.

in *Journal of American Medical Association*, p. 672, Feb. 25, 1956

# FABRICATION OF ACRYLIC JACKET CROWNS WITHOUT LABORATORY FACILITIES

EYMARD L. DOYLE, *Commander, DC, USN*

**D**ENTISTRY IN the armed services calls upon the ingenuity of the dental officer to overcome many problems not faced by his civilian counterpart. One such problem is restoration of the function and esthetic appearance of an anterior tooth that is too badly broken down to be restorable by normal operative procedures. Should a prosthetic facility be present, the problem is minor. There are many dental activities, however, which are not so equipped; then the dental officer may either put on a celluloid crown with silicate cement or place a restoration on the mesial or distal surface without attempting to restore the incisal edge. Both methods leave much to be desired. A method that is felt to be functionally and esthetically more suitable involves the preparation and fabrication of an acrylic jacket crown using the cold-cure acrylic resins. This technique will work as well for posterior teeth as for anterior.

The disadvantages of acrylic in jacket crown prosthesis are well known. It has been found that, due to the resiliency of the material and to masticatory stress, a jacket crown will eventually spread or give at the gingival margin. It is also known that in time the material will show the ravages of wear and necessitate replacement in order to maintain the tooth in proper function. These disadvantages can be overcome by employing a gold casting with a labial window cut for the reception of acrylic. The resulting crown will remain snugly adapted at the gingival margin and resist wear on the incisal and lingual surfaces, yet maintain an esthetic appearance labially.

The technique to be described is a compromise that can be used at dental activities not possessing laboratory facilities. Where a gold and acrylic crown or a porcelain jacket crown is to be constructed, this acrylic jacket crown is highly recommended for use during the time the more permanent jacket is being made.

## METHOD

The tooth is prepared in the manner best suited to the operator, except that a shoulder is not desirable. A chamfer finish, or

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From Dental Department, Headquarters and Service Battalion, Fleet Marine Force, FPO, San Francisco, Calif.

merely a taper finish to the gingival attachment, is employed. In lieu of the gold casting at the gingival margin, an annealed copper band collar is used to obtain a definite finish line at the gingival attachment and also to help prevent spreading of the acrylic and eventual leakage beneath the gingiva. It will also impart strength to the finished jacket crown.

An annealed copper band that fits snugly at the gingival attachment is contoured accurately to the preparation. The gingival adaptation is checked with an explorer. A cut is made from the incisal edge down toward the gingival margin so that only about 1 mm remains above the gingiva on the labial, incisal, and distal sides, and 3 mm on the lingual. Two or three cuts are placed on the lingual part of the band that extends above the gingiva, to give a mechanical lock for the acrylic.

The copper band collar is then placed in position on the tooth beneath the gingiva. The tooth is isolated with cotton rolls and dried thoroughly. Then with a sable brush, a thin mix of cold-cure acrylic is painted on the tooth and copper band. A small amount of acrylic powder and liquid is placed in a mixing jar; when it has set long enough to be easily handled, it is placed on the tooth and contoured with the fingers. The patient closes his mouth in centric occlusion and the assistant sprays water on the area until the acrylic hardens. It is then removed with a crown remover and a thin mix of acrylic is painted on the area of junction of copper band and crown, and any other area where necessary.

Diaks and burs are used in carving, care being taken not to destroy the mesial and distal contact. The crown is tried on the tooth. Centric occlusion is checked for high spots and lateral and protrusive excursions, and the crown is polished with pumice and whiting. The exterior of the jacket crown is lubricated and the prepared tooth dried and cemented in place.

#### SUMMARY

A technic for the preparation and fabrication of an acrylic jacket crown using an annealed copper band and cold-cure acrylic resin is recommended for use at dental activities without laboratory facilities, or for construction of a temporary crown to be worn while a gold and acrylic crown is being completed. It is believed that by using the copper band collar at the gingival margin, spreading and subsequent leakage will be greatly eliminated, added strength imparted, and a definite gingival finish established. A functional and esthetic acrylic jacket crown can thus be made for patients while in the chair. At any later date, a more permanent gold and acrylic crown can be constructed without need of altering the existing preparation.



## Clinicopathologic Conference

Army and Navy Hospital, Hot Springs, Ark.\*

### ARTHRITIS AND DERMATITIS

**Summary of Previous Clinical History.** A 47-year-old man had been well until nine months prior to his first admission to this hospital when he noted dull, aching sensations in the hands, wrists, and shoulders. Two months later pain in both hips necessitated his admission to a hospital. He returned to duty in one month but continued to have mild joint pains. After two months he was re-hospitalized because of severe pains in the right hip, knees, fingers, shoulders, and wrists.

#### FIRST ADMISSION

Four months later he was evacuated to this hospital because of persistence of joint symptoms, generalized weakness, and loss of 20 pounds in weight.

**Physical Examination.** The patient was a chronically ill man weighing 160 pounds. The head and neck were normal. The heart was small, with a normal rhythm and no murmurs. The lungs, abdomen, genitalia, and prostate were normal. The blood pressure was 134/84 mm Hg. The vital signs were normal. There was mild tenderness in the right knee, elbows, wrists, shoulders, hips, ankles, and metacarpophalangeal and interphalangeal joints of the hands, as well as the metatarsophalangeal joints. There were small subcutaneous nodules on the tip of and just distal to the elbow on each forearm.

**Laboratory Studies.** The urine was normal with a specific gravity of 1.020. The hemoglobin was 14.2 g per 100 ml, and the white blood cell count was 9,800 per  $\mu$ l, with 65 per cent neutrophils and 35 per cent lymphocytes. The sedimentation rate was 28 mm per hour (Wintrobe). The serologic test for syphilis was negative. The electrocardiogram was normal. Roentgenograms of the chest,

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\*At the time of this conference, Col. Charles T. Young, MC, USA, was Commanding Officer. From the Department of Medicine, Col. George M. Powell, MC, USA, Chief. Col. Powell is now assigned to Fitzsimons Army Hospital, Denver, Colo.

sacro-iliac joints, shoulders, and elbows were negative, and those of the wrists, hands, knees, and ankles showed osteoporosis.

**Course in Hospital.** On a program of rest, physical therapy, and salicylates, fair symptomatic relief was obtained. He was discharged four months after admission.

#### SECOND ADMISSION

During the two years since his first admission, the patient's joint symptoms had continued to be mild, but subcutaneous nodules had appeared at almost every pressure point. Six months previously he had had epigastric pains, and on roentgenographic examination a duodenal ulcer was found. Treatment with a Sippy regimen had relieved the "ulcer" symptoms. This admission was for the purpose of instituting chrysotherapy for his arthritis.

**Physical Examination.** Abnormal physical findings consisted of weight loss to 118 pounds, tenderness in the midepigastrium, subcutaneous nodules on most extensor surfaces, and marked limitation of motion of the shoulders, elbows, fingers, and knees. The blood pressure was 122/70 mm Hg.

**Laboratory Studies.** The urine was normal. Hemoglobin was 13.5 g per 100 ml, and the white blood cell count was 6,600 per  $\mu$ l, with 71 per cent neutrophils. Blood urea nitrogen, serum albumin and globulin, sulfobromophthalein sodium test, and gastro-intestinal roentgenograms were all normal. Roentgenograms of the feet, hands, and wrists showed marked rheumatoid changes.

**Course in Hospital.** The patient received 170 mg of gold with alleviation of his arthritic symptoms, but severe dermatitis and vomiting developed, which subsided after chrysotherapy was discontinued. He was discharged on the 82d hospital day.

#### THIRD ADMISSION

For four months the patient's symptoms had remained unchanged; seven days prior to this admission he developed a sore throat and difficulty in swallowing.

**Physical Examination.** Physical findings, except for the presence of an injected and ulcerated posterior pharynx, were unchanged.

**Laboratory Studies.** On admission urinalysis was negative for albumin. The hemoglobin and leukocyte and platelet counts were normal. A cephalin cholesterol flocculation test was 4 plus in 24 hours. A sulfobromophthalein sodium test was normal. A Congo red test showed no dye either in urine or in the second specimen of blood. Esophageal roentgenographic study revealed neuromuscular in-coordination.

**Course in Hospital.** The sore throat and dysphagia gradually disappeared. On the 47th day his urine gave a 4-plus test for albumin and showed granular casts and white and red blood cells. Thereafter, albumin, casts, and microscopic hematuria remained constant urinary findings. On the 68th day ankle edema was first noted. This disappeared following the administration of mercuranthin (brand of mercuriohyaline injection), but in a few days edema returned accompanied by dyspnea and a temperature ranging to 104°F. A roentgenogram of the chest revealed pneumonia and pulmonary congestion. The chest cleared and dependent edema subsided with mercurials, digitalis, and antibiotics. His course thereafter was uneventful and he was discharged on the 104th day.

#### FOURTH ADMISSION

In the nine-month interval between admissions there had been no essential change. This admission was for the purpose of starting cortisone therapy.

**Physical Examination.** There was marked multiple joint deformity and edema of the ankles. The heart and lungs were normal. The blood pressure was 160/110 mm Hg.

**Laboratory Studies.** The hemoglobin was 8.38 g per 100 ml. Urine showed 4 plus albumin and many formed elements. Serum albumin was 3.44 g and globulin 5.28 g per 100 ml. The blood urea nitrogen was 21.7 mg per 100 ml.

**Course in Hospital.** The patient's weight decreased from 130 to 116 pounds and the blood pressure returned to normal as a result of salt restriction, digitalis, and mercurial diuretics. He was placed on cortisone therapy but relief was minimal. His weight remained stationary and he was discharged on the 57th day on a maintenance dose of 50 mg of cortisone daily.

#### FIFTH ADMISSION

Three months later he was readmitted because of severe pain in the cervical spine. There had been no other change in his condition.

**Physical Examination.** New physical findings included marked tenderness and limitation of motion of the cervical spine. The heart and lungs were negative. There was no edema. The blood pressure was 180/100 mm Hg.

**Laboratory Studies.** The urine showed a specific gravity of 1.020 and gave a 1-plus test for albumin. Serum albumin was 3.85 g and globulin 4.08 g per 100 ml. Serum calcium, phosphorus and alkaline phosphatase, and blood urea nitrogen were normal.

**Course in Hospital.** Relief was obtained with physical therapy and he was discharged on the 25th day.

#### SIXTH ADMISSION

Fourteen months later he was readmitted because of hemoptysis of about 10 ml, which had occurred a few hours previously. The right leg had been swollen for three weeks. A diagnosis of pulmonary infarction was entertained. Skin bullae had appeared during the past six months and spread to involve the entire body.

**Physical Examination.** The heart and lungs were normal. The blood pressure was 180/110 mm Hg. There was mild edema of the right leg without tenderness. Multiple large bullae were observed over the entire body.

**Laboratory Studies.** The urine gave a 3-plus test for albumin and showed a few red blood cells. Hemoglobin was 10.6 g per 100 ml. A chest roentgenogram revealed an infiltrate in the right apex. Sputa studies for acid-fast bacilli and tuberculin tests were negative. An electrocardiogram was normal.

**Course in Hospital.** Follow-up chest roentgenograms showed complete clearing. The skin lesions were mildly improved. Cortisone was discontinued because of the possibility of tuberculosis. After an uneventful course he was discharged on the 33d day.

#### FINAL ADMISSION

Two months later he was readmitted because the bullous skin lesions had become unmanageable.

**Physical Examination.** Skin bullae of various sizes were present over the entire body. The heart and lungs were normal. The blood pressure was 160/100 mm Hg.

**Laboratory Studies.** The urine revealed a specific gravity of 1.014, gave a 3-plus test for albumin, and showed a few red blood cells. Hemoglobin was 10.4 g per 100 ml. The white blood cell count and differential counts were normal. Blood urea nitrogen was 27 mg per 100 ml. The serologic test for syphilis was negative. An examination of the peripheral blood for lupus erythematosus cells was negative.

**Course in Hospital.** There was no significant change until the 32d day when paralysis of the right upper extremity developed. In a few days he became semicomatose. This was followed by acute pulmonary edema and death on the 41st day of hospitalization, approximately five years after the onset of symptoms.

#### DISCUSSION

**Doctor Powell:** In summary, this middle-aged white man had a prolonged illness of five years' duration. It began with mild joint symptoms

which progressed to crippling, multijoint deformity. During the long course, marked weight loss occurred, and in sequence he developed duodenal ulceration, evidence of renal damage, hypertension, congestive heart failure, pulmonary infarction, a generalized bullous dermatitis and, terminally, hemiplegia followed by pulmonary edema.

When one is presented with such a patient whose disease involves nearly all of the major body systems, one either has to make several diagnoses or has to select one diagnosis that will offer a satisfactory explanation for the many manifestations. The latter, when possible, is of course preferable.

If we are to explain all the findings on the basis of a single diagnosis, such widespread involvement as evidenced in this patient appears to force us to look to the group of collagen diseases for an answer. Usually recognized as members of this group are: serum sickness, rheumatic fever, scleroderma, dermatomyositis, rheumatoid arthritis and its variants, periarteritis nodosa, and disseminated lupus erythematosus.<sup>1</sup>

Of this group only the last three named—rheumatoid arthritis, periarteritis nodosa, and disseminated lupus erythematosus—appear to be worthy of consideration in the differential diagnosis of this particular case. These diseases have many features in common that were manifest in this patient. They include: a chronic, relapsing, general long course; extreme weight loss and weakness; arthritis; vascular disturbances; cardiac, pulmonary, muscular, and renal lesions; rheumatoid nodules; increased sedimentation rate; increase in serum globulin; and decrease in albumin.<sup>1</sup>

As far as rheumatoid arthritis is concerned, this patient certainly developed the characteristic joint changes and subcutaneous nodules of this disease, and for the first few years these local manifestations typically overshadowed the systemic manifestations; however, the development of predominant systemic manifestations later renders a diagnosis of rheumatoid arthritis, per se, almost untenable. Some of the changes—to wit, albuminuria, renal insufficiency, and myocardial failure—could be explained on the basis of amyloidosis which occasionally occurs in late cases of rheumatoid arthritis.<sup>1</sup> Amyloidosis was supported in this case by a positive Congo red test, which I hasten to add is often misleading. Although secondary amyloidosis may have been present, I doubt that it was important, and I certainly do not feel that it explains all the features evidenced by this particular case.

The second possibility is periarteritis nodosa. The fundamental lesions in this disease involve the medium- and small-sized blood vessels, the lumina of which are reduced in size and may be obliterated. Thrombosis, partial healing with cicatrization, aneurysmal dilatation, rupture, and hemorrhage may occur. As would be expected, the clinical manifestations vary depending upon the number, site, and degree of



in disseminated lupus and their presence with the other manifestations of disseminated lupus constitute the picture that we term the Senear-Usher syndrome.

My final diagnosis is without qualification, therefore: lupus erythematosus disseminatus with the Senear-Usher syndrome. In addition, in all probability, this man should have some evidence of Libman-Sacks' disease.

Doctor Throm:\* In considering the differential diagnosis of this involved case, it is difficult to find a single diagnosis that will satisfy. For a long time prior to the terminal state it was apparent that this man had typical severe and extensive lesions of rheumatoid arthritis, and that his urinalyses routinely showed chronic nephritic changes. Then he began to show bullous lesions of the skin, which developed with increasing frequency and severity. These bullae were of variable size (some large but scarcely massive), arose out of apparently normal skin, and exhibited a tendency to clustering although distributed generally except for the palms and soles. The Nikolsky sign was positive, and the lesions could not be distinguished clinically from those of pemphigus vulgaris. *But in the final days before the patient died there was very little bullous activity in the skin, which became practically asymptomatic. Only on one occasion was a small hemorrhagic vesicle noted in the mouth, and again a single, thin bulla appeared transiently on the lower lip. The patient was not of Hebrew descent. I feel confident that this man did not have pemphigus.*

Clinically, the skin lesions looked like dermatitis herpetiformis also, but the patient was given adequate trial of sulfapyridine without effect. The bullae did not manifest the hemorrhagic quality commonly seen in *polyarteritis nodosa*.

After the appearance of the bullae some clinicians suspected that the patient suffered from disseminated lupus erythematosus (and indeed the skin lesions were compatible with this diagnosis), but they were unable to prove it because of the absence of some manifestations generally found in such cases, as already noted by the previous discussors. Besides, the condition is rare in males and in this age group.

That the patient had a toxic bullous dermatosis there can be no doubt, but I incline to regard the cutaneous manifestations as erythema multiforme secondary to active kidney, liver, and joint disease. My final diagnosis in this case was: Erythema bullosum pemphigoides, secondary to severe rheumatoid arthritis and chronic nephritis.

Dr. Powell's diagnosis:

Disseminated lupus erythematosus

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\*Lt. Col. Urban L. Throm, MC, USA, Chief, Outpatient Service and Dermatology Service.



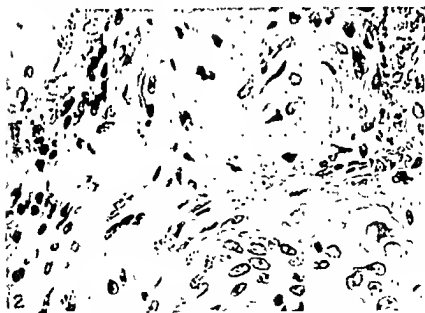
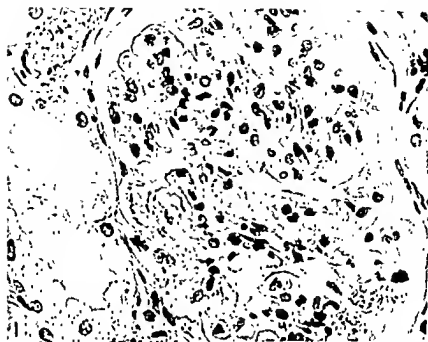



Figure 1. Thickening of capillary walls in glomerular loops. ( $\times 530$ )

Figure 2. Occlusive changes in renal arterioles. ( $\times 530$ )



*Figure 3. L.E. cell in peripheral blood obtained about one month before the patient's death. ( $\times 675$ )*

nective tissues contained areas of fibrinoid change. In other respects these lesions resembled pemphigus vulgaris. Fibrinoid changes were found in peri-aortic connective tissues and in synovial tissues as well. In areas of pericardial fibrosis, fibrinoid material was observed. The adrenals showed almost complete loss of cortical lipid and some increase of interstitial connective tissues. Arteriosclerosis of any common variety was exceptionally mild, although there were mild atherosclerotic changes in the aorta and intimal thickening of some of the arteries.

**Pathologic diagnosis:**

Disseminated lupus erythematosus with Senebar-Usher syndrome

**Doctor Glaser:** I would like to hear comment on such experience as is known concerning the Congo red test in rheumatoid arthritis or lupus erythematosus. I would also like to inquire about the terminal localized paralysis for which we found no explanation.

**Doctor Powell:** As I mentioned in my discussion the Congo red test is very often misleading; so much so that it is not used as frequently at the present time as it has been in the past. It must be interpreted in the light of other evidence of amyloidosis.

I think the question of the patient's terminal hemiplegia is fairly easily answered. Because of multiple vascular lesions, vascular acci-

dents may occur in any part of the body. Fibrinoid thickening of the intima often results in thrombosis. Another possibility, of course, is actual rupture of the vessels with hemorrhage which does occur on occasion. Hemiplegia due to involvement of the cerebral vessels is common in this disease.

**Doctor Throm:** I have one comment with regard to the question of hemiplegia. In retrospect, this was not the typical thing seen after a cerebral vascular accident. It started first with the hand and moved proximally. Over the course of several days it could be seen to progress. It would seem as though it might fit in with a progressive obliterative type of arteritis.

**Doctor Stokes:**\* Was there anything unusual about the gluteal abscess?

**Doctor Throm:** I don't think I can answer that. It couldn't have been related to the skin lesions. This man exhibited the most massive Nikolsky sign I have ever seen; he had these bullous lesions up to the size of a nickel widely scattered over his back, and when he twisted in bed one night the epidermis over the entire area stuck to the sheet, resulting in a circular pattern of slippage on the underlying corium.

**Doctor Bergman:**\*\* I would like to know what is the causal relationship, if any, between rheumatoid arthritis and lupus erythematosus.

**Doctor Gleser:** Practically all patients with disseminated lupus erythematosus have, at some time or other, more or less severe joint symptoms. I believe I am right in stating that it is impossible to differentiate between this type of arthritis and rheumatoid arthritis. They are certainly closely related diseases, and one might wonder whether they are the same disease.

**Doctor Crompton:** I would like to say that the collagen diseases are basically the same disease, the evidence for this being really pretty good. They all have a common cause; they are all bizarre, allergic responses on the part of certain tissues of the body. From the standpoint both of the production of these diseases experimentally, and of the relief of their manifestations by a medicine that prevents these allergic (and finally degenerative) responses, namely, cortisone or ACTH, the evidence indicates that there is a common causative factor. In each of the collagen diseases a different tissue or group of tissues is involved in this fundamental pathologic process.

However, it is never justified clinically to say, for example: "Since they are all one disease, segregation into separate entities is useless and impossible." From the standpoint of prognosis and therapy, separation of these diseases is distinctly worthwhile.

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\*Capt. James M. Stokes, MC, USA, Chief, General Surgery Service.

\*\*Lt. Col. Philip A. Bergman, MC, USA, Chief, Department of Surgery.

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## THE DERMATOLOGIST

"As the cynic has said, there are two sorts of general practitioner—the first sort knows no dermatology and regrets it, the second knows no dermatology and boasts about it. Often, indeed, the only dermatological literature the student or practitioner ever reads is what he receives free from the advertisers. I would urge him to think on these things and consider some of the simple remedies. In Whitfield's hands they worked; he prescribed them with dignity, with authority, and with confidence, understanding the whole patient and his disease. These qualities all can strive to acquire; add to them a knowledge of a few simple remedies and what they can do, and an awareness that blunders are dangerous, and you will succeed in treating skin diseases, as well as, if not quite with the happy self-confidence of, an old general practitioner friend of mine who says he can diagnose no skin disease but can treat them all."

—DAVID I. WILLIAMS, M. B., F. R. C. P.  
in *British Medical Journal*  
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# INTESTINAL PARASITE SURVEY OF KOREAN PRISONER-OF-WAR CAMP

MARION M. BROOKE, *Sc. D.*  
CLYDE SWARTZWELDER, *Ph. D.*  
FRED J. PAYNE, *M. D.*  
PAUL WEINSTEIN, *Sc. D.*  
WILLIAM W. FRYE, *Ph. D., M. D.*

**I**N May 1951, a Joint Dysentery Unit was established on the island of Koje, south of Pusan, to study enteric infections among the North Korean prisoners of war. As a part of this investigation, fecal specimens were collected for a survey of parasitic infections in persons housed in the prison compounds. The specimens were collected from prisoners who were not known to have clinical manifestations of disease. The primary purpose of this survey was to obtain an estimate of the amebiasis problem in the various compounds, for possible epidemiologic consideration. The diagnosis and treatment of clinical cases of amebiasis have been reported elsewhere.<sup>1</sup>

## METHODS

**Collection and Preservation of Fecal Specimens.** Arrangements for the survey were made with the medical officer-in-charge of the compounds. There were 20 compounds in the camp, each containing from 6,000 to 10,000 persons, housed 50 to a tent. A time was set for collecting specimens, and the compound commander was given specific instructions on the procedure for selecting persons to be examined. The physician in charge of each compound dispensary was asked to assist in making arrangements for collecting specimens. These physicians were prisoners and, in many instances, understood and could speak English. A South Korean physician who worked in the parasitology laboratory of

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This report concerns one phase of investigations conducted in Korea by a Joint Dysentery Unit sponsored by the Commission on Enteric Infections of the Armed Forces Epidemiological Board. The personnel who participated came from Walter Reed Army Institute of Research, Fleeter Epidemic Disease Control Unit No. 1, National Microbiological Institute and Communicable Disease Center of U. S. Public Health Service, 406th Medical General Laboratory, 64th Field Hospital, Bureau of Laboratories of Florida State Board of Health, and Louisiana State University School of Medicine. Drs. Brooke and Payne came from the Communicable Disease Center, Drs. Swartzwelder and Frye from Louisiana State University School of Medicine, and Dr. Weinstein from the National Microbiological Institute. Dr. Brooke is now at Communicable Disease Center, Laboratory Branch, P. O. Box 185, Chamblee, Ga.

the Joint Dysentery Unit was present when the arrangements were made in order to ensure that the instructions were understood.

During the late afternoon, pasteboard containers were taken to the compound and a team was organized to obtain from three to five specimens from as many different tents as possible. An attempt was made to collect specimens from about 125 persons well distributed among the tents of each compound.

Early the following morning, stools were collected under supervision and brought to the compound dispensary. Only one stool specimen was collected from each person. In order to make it possible to detect and identify all types and stages of parasites, a two-vial method for preserving specimens was used.<sup>2</sup> About five-milliliter portions of each specimen were placed in two separate screw-capped glass vials, one containing 10 per cent formalin and the other polyvinyl alcohol (PVA) fixative. The fecal specimen was mixed well in each container with applicator sticks. Because the majority of specimens were soft, it was not difficult to get an adequate portion into each vial. After all specimens were collected, the vials were returned to the laboratory where additional formalin or polyvinyl alcohol fixative was added; the caps were secured with adhesive tape and the specimens were packed carefully for shipment to the United States.

Specimens from prisoners in 18 compounds were examined at the Louisiana State University School of Medicine and from those in two other compounds were examined at the Communicable Disease Center of the U. S. Public Health Service. The same techniques were used in both laboratories after a joint period of instruction for the technicians.

#### EXAMINATION OF SPECIMENS

**Formalin-Ether Technic.** Specimens preserved in 10 per cent formalin were concentrated by the formalin-ether sedimentation technic for the recovery of protozoan cysts and helminth eggs. The technic used was essentially the same as that described by Ritchie<sup>3</sup> for fresh specimens. Unstained and iodine-stained wet mounts were prepared from the concentrated sediments and examined microscopically.

**Polyvinyl Alcohol Fixative Technic.** Films prepared on slides from specimens preserved in polyvinyl alcohol fixative were thoroughly dried, and then stained by the Heidenhain iron hematoxylin procedure. The polyvinyl alcohol fixative technic is designed primarily for the preservation and shipment of stool specimens containing amebic trophozoites.<sup>2</sup> Stained films were examined under oil immersion objective for a minimum of 10 minutes each.



## RESULTS

A total of 1,870 specimens were collected, 1,726 being suitable for examination. Of those examined, 1,682 or 97.5 per cent were positive for intestinal parasites (table 1). Seven species of intestinal protozoa were identified. Five species of amebas were found. *Entamoeba coli* was observed most frequently (42.9 per cent), *Entamoeba histolytica* next (33.9 per cent), and *Dientamoeba fragilis* least often (four cases). *Giardia lamblia* was identified in 6.9 per cent of the specimens, and *Chilomastix mesnili* in 2.0 per cent. Several unidentified amebas and flagellates were observed but they are not recorded in the table.

TABLE 1. Prevalence of intestinal parasites

Parasites	1,726 North Korean prisoners of war		919 South Korean civilians*
	Number positive	Per cent positive	Per cent positive
Protozoa: **			
<i>Entamoeba histolytica</i>	585	33.9	5.0
<i>Entamoeba coli</i>	741	42.9	27.1
<i>Endolimax nana</i>	552	32.0	8.3
<i>Iodamoeba bütschlii</i>	177	10.3	0.8
<i>Dientamoeba fragilis</i>	4	0.2	—
<i>Giardia lamblia</i>	119	6.9	3.5
<i>Chilomastix mesnili</i>	34	2.0	1.1
Helminths:			
<i>Ascaris lumbricoides</i>	1,401	81.3	82.4
<i>Trichuris trichiura</i>	1,344	77.9	81.1
Hookworm	634	36.7	46.5
<i>Trichostrongylus</i> sp.	17	1.0	23.6
<i>Strongyloides stercoralis</i>	9	0.5	0.1
<i>Taenia</i> sp.	29	1.7	—
<i>Diphylllobothrium</i> sp.	1	0.05	—
<i>Clonorchis sinensis</i>	50	2.9	7.1
<i>Paragonimus westermani</i>	17	1.0	0.9
<i>Fasciolopsis buski</i> or <i>Fasciola hepatica</i>	6	0.3	—
Total persons infected	1,682	97.5	94.5

\*Figures from table 6, p. 9, of reference 10.

\*\*Unidentified protozoa are not recorded.

Six species of helminths were identified. The species most frequently encountered was *Ascaris lumbricoides* (81.3 per cent) and the helminth least frequently observed was *Diphylllobothrium*

sp. (one case). The hookworms, *Trichostrongylus*, *Tacnia*, and *Diphyllobothrium* present were not identified to species because only the eggs were available. Likewise, no attempt was made to differentiate between eggs of *Fasciolopsis buski* and those of *Fasciola hepatica* although it is probable that those found represented the former species.

A comparison of the effectiveness of the formalin-ether concentration technic and the polyvinyl alcohol fixative technic in detecting amebic infections is presented in table 2. The polyvinyl alcohol fixative technic revealed higher percentages of *E. histolytica*, *Endolimax nana*, and *Iodamoeba bütschlii* than the formalin-ether concentration technic, while the reverse was true for *E. coli*. With all four organisms, the combined use of both technics increased the number of positive findings. Most of the helminth infections were detected by the formalin-ether technic.

TABLE 2. Formalin-ether and polyvinyl alcohol fixative technics in detecting infections with four species of amebas in 1,726 stool specimens

Amebae	Total number identified	Positive by formalin-ether technic		Positive by polyvinyl alcohol fixative technic	
		Number	Per cent of total	Number	Per cent of total
<i>Entamoeba histolytica</i>	585	407	70	511	87
<i>Entamoeba coli</i>	741	649	88	536	72
<i>Endolimax nana</i>	552	302	55	474	86
<i>Iodamoeba bütschlii</i>	177	97	55	150	85

## DISCUSSION

During the seven months of investigation by the Joint Dysentery Unit, about 650 cases of amebic dysentery were diagnosed on sigmoidoscopic examination.<sup>1</sup> In view of this number of recognized cases and the numerous others which probably occurred, there is little wonder that the present survey revealed 33.9 per cent of the prisoners of war positive for *E. histolytica*. An attempt was made to correlate for each of the 20 compounds the number of observed cases of amebic dysentery and the prevalence rates of *E. histolytica* as revealed by this survey. Although the incompleteness of the data did not permit strict comparisons to be made, there appeared to be little or no correlation between the two. Higher prevalence rates of *E. histolytica* infections have been reported in the literature with much less associated amebic dysentery or even milder symptomatic cases of amebiasis. For

example, Reardon<sup>4</sup> found 42 per cent of the patients in a mental institution in Georgia infected with *E. histolytica*, but observed no clinical amebiasis. It is only possible to speculate on why there were numerous cases of amebic dysentery in the prisoner-of-war camps. Although the presence of more virulent strains of *E. histolytica* cannot be disregarded, it would appear, as suggested by Westphal,<sup>5</sup> Nauss and Rappaport,<sup>6</sup> and Blumenthal and co-workers,<sup>7</sup> that the trauma to the intestinal mucosa from frequent bacterial infections may have been responsible for many of the cases on Kojima Island. During the seven-month investigation, over 1,400 cases of acute shigellosis were diagnosed in the prison hospital<sup>8</sup> and many other gastro-intestinal disturbances remained undiagnosed. Numerous cases of simultaneous shigellosis and amebiasis were observed. Furthermore, there is a possibility that milder infections with bacteria may have played a role in predisposing the mucosa to invasion by *E. histolytica*.

Hunter and co-workers<sup>9,10</sup> reported on intestinal parasite surveys of civilian populations in Korea. Although rates for helminths in the civilian and prisoner-of-war surveys are remarkably similar (*Trichostrongylus* sp. and *Clonorchis sinensis* excepted), those for protozoa are much higher among the prisoners of war (table 1). For example, 5 per cent of the Korean civilians and 33 per cent of the prisoners of war were found infected with *E. histolytica*. In part, this difference is due to the techniques used. In both surveys, one specimen per person was collected and examined by the formalin-ether concentration technique. However, the present study included, in addition, the examination of stained films prepared from specimens preserved in polyvinyl alcohol fixative. The remaining difference between the rates in civilians and prisoners of war probably reflects the effect of military combat and imprisonment. Hunter and co-workers<sup>10</sup> have suggested that the custom of drinking hot tea instead of water may be responsible for maintaining a low prevalence rate of *E. histolytica* in Korean civilians, the infective cysts being destroyed by heat. If this is the case, the inability of the prisoners of war to follow this custom may have contributed to the increased prevalence of *E. histolytica* and other protozoa.

The prevalence rates for the helminths in the prisoners of war are interesting because, in several instances, they are similar to those for the Korean civilians (table 1). The rates for *Ascaris lumbricoides* and *Trichuris trichiura* are practically identical. This would appear to indicate that during combat and imprisonment, fecal contamination of human origin had not been reduced for the prisoners of war. As a matter of fact, contamination probably had been more frequent, as evidenced by the increased preva-

lence of the protozoa. On the other hand, the lower rate for hookworm in the prisoners of war may have reflected a change in the mode of life for these Korean men. Because hookworm infection is acquired by penetration of larvae through the skin, the change from an essentially rural existence with close contact with soil to the military and prison life with greater utilization of shoes, probably reduced the re-exposure to this parasite.

The 10 per cent formalin and the polyvinyl alcohol fixative technics for preserving stool specimens are convenient and efficient in conducting surveys. With these preservatives, it is possible to collect specimens in one part of the world and to examine them in another several months later.

In conducting surveys for intestinal parasites, it is advisable to combine a concentration technic with a procedure which will recover trophozoites.<sup>11</sup> By examining the specimen preserved in formalin by the Ritchie formalin-ether concentration technic and the portion preserved in polyvinyl alcohol fixative by stained hematoxylin films, this objective is accomplished. The formalin-ether technic reveals helminth eggs and larvae, and protozoan cysts; the stained polyvinyl alcohol film allows detection of amebic trophozoites and, to a lesser degree, protozoan cysts. In the present study, the soft consistency of many of the stool specimens favored the presence of trophozoites rather than cysts. Although trophozoites were recovered by the formalin-ether technic, they could be identified reliably only with the polyvinyl alcohol fixative technic. These two technics supplement one another in the detection of amebic infections because each procedure permits identification of organisms missed by the other (table 2).

#### SUMMARY

During the summer of 1951, 1,726 Korean prisoners of war on the Island of Koje (Korea), were examined for intestinal parasites. Portions of a single, normally passed stool per person were preserved in two vials, one containing 10 per cent formalin and the other PVA-fixative. The formalin-ether sedimentation technic was performed on the first portion and a permanently stained film (iron hematoxylin) was prepared from the second. A total of 1,082 prisoners (97.5 per cent) were found to be infected with one or more species of protozoa or helminths. The prevalence rate for *E. histolytica* was 33.9 per cent.

The formalin and polyvinyl alcohol fixative technics for stool preservation, and the formalin-ether sedimentation and the permanently stained films for examination, constituted an efficient method of conducting surveys for intestinal parasitic infections.

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## THE SOLDIER AND THE STATESMAN

The soldier is dependent upon the statesman not only for allocations of men and materials, but for the climate of international agreement in which he can successfully carry out his tasks . . . The statesman and the soldier both necessarily depend for their effectiveness upon each other. The military man, within his specialized field, must keep in mind that he is called in only when other methods have failed. The statesman should remember always that the soldier's effectiveness in supporting any national policy is only as great as his capability.

—MATTHEW B. REDGWAY, Gen., U. S. A.  
in *Armed Forces Management*  
pp. 26-27, Nov. 1954



tion, and the next day in the battalion area in a nearby valley, living under fairly comfortable field conditions. In reserve he lives in a rear area under camp conditions, but training, education, physical conditioning, care of clothing and equipment, and police and other camp activities are carried on. He has opportunities for sports, recreational activities, and some hobbies, but little opportunity for associating with the opposite sex until he becomes eligible for a one-week Rest and Rehabilitation visit to Japan after four to six months of service in Korea. Not until recently have the natives been permitted to return to their fields adjacent to the defense lines dominating the Demilitarized Zone.

It is the psychiatric experiences of these troops in the combat readiness stage while manning the ramparts covering the Demilitarized Zone that will be compared with those of the troops, in some cases the same troops, who fought bloody engagements in the same area before the armistice. It is significant that all the divisions on the line at the time the cease-fire occurred continued to operate in relatively their same positions in the combat line for up to a year in most cases and even longer in some instances. After the armistice was inaugurated, strengthening positions and guarding their various sectors of the line was the mission of these divisions.

### ORGANIZATION AND OPERATIONS

The psychiatric operational organization of the postcombat period remained basically much the same as during the combat period. Of course, the tactical situation remained static, and did not require the urgent evacuations from forward echelons that often occurred in the ebb and flow of a battle. The forward stations, however, as in the combat period, were limited in their holding capacities as well as in treatment facilities. As in the later phases of World War II, the psychiatric organization in Korea was and continues to be in echelon. It followed the pattern with modifications and variations as set forth in Army directives in 1950<sup>1</sup> following the best thinking of those who were involved in the practice of combat psychiatry during World War II. Authors<sup>2-4</sup> who employed those ideas effectively in the organization and administration of neuropsychiatric facilities in the Korean campaign have reported their experiences.

World War II and, indeed, World War I demonstrated the paramount importance of and the crucial role played by the division psychiatrist in reducing the psychiatric noneffective and evacuation rate.<sup>5</sup> Whereas it took two years for the division psychiatrist to be reinstated and established in the World War II combat division, the 24th Infantry Division, which was the first on the scene of battle in the Korean campaign—its full complement having been flown or shipped by rail and water from Japan into

South Korea within 10 days of the outbreak of hostilities—had a division psychiatrist with it. Two other divisions joined the 24th within a fortnight after its arrival, but these two added divisions had no division psychiatrist with them. At the moment it was of no serious consequence, because little or no intradivisional psychiatric treatment was feasible in view of the continuing forced withdrawal and delaying tactics employed by the defending troops.<sup>2</sup> Within two months intradivisional psychiatric treatment was in full operation in the four Army divisions then in Korea, and was functioning in a highly effective manner. This transpired chiefly because the lessons learned in World War II had survived in a recognizable state through Army training circulars,<sup>1</sup> directives, consultants' conferences, and the inclusion of a psychiatrist in the Table of Organization of a combat division, even if in some cases the space was not filled during periods of garrison living.

The establishment of intradivisional psychiatry was quickly followed by Army and theater psychiatric operations, single channeled and in echelon, as the tactical situation stabilized. This permitted centralized and positive control of screening, treatment, and evacuation. The man who becomes a psychiatric casualty on the battlefield receives what might be called psychiatric first aid from his buddies, squad, platoon, and company leaders or from some combat veteran who has a certain ego-supporting relationship with the soldier. When unit supports are not efficacious, the soldier enters medical channels at the battalion aid station where definitive if simple treatment is afforded by the battalion surgeon or his assistants; 60 per cent or more of such men are returned to full duty. In this 60 per cent are included those treated on an excused-from-duty as well as outpatients-still-on-duty status. If further evacuation is necessary, the patient receives further evaluation and treatment at the division clearing station, the rear echelon of divisional treatment facilities.

Here treatment is under the direct supervision of the division psychiatrist. Up to 50 or 75 per cent of psychiatric casualties at this level would be expected to return to combat duty. Depending upon the tactical situation, of course, casualties would usually remain at the battalion aid station from 24 to 48 hours and at the clearing station for from 3 to 5 days. Those not considered salvageable for combat in the division areas within the time limits established by the policy of higher headquarters are the evacuated to the Army psychiatric treatment center operated at the evacuation hospital level and under the control of the Army surgeon. Those men not considered salvageable for combat duty normally would be further evacuated to convalescent hospital in the Army area, where it is feasible to give more prolonged treatment; those requiring hospitalization would be evacuated



to hospitals in the Communications Zone specializing in the treatment of neuropsychiatric diseases, or to general hospitals located there.

In Korea during combat, one augmented neuropsychiatric treatment center served not only the Eighth Army and the Tenth Corps, but also base installations and personnel supporting the troops on the battlefield. Paradoxically, psychiatric casualties were often evacuated forward, not only to the neuropsychiatric treatment center which had the only evacuation authority for neuropsychiatric cases from the area, but at times psychiatric casualties were also evacuated forward to the battalion aid station in the division area if they were found to be stragglers. This organizational and operations pattern continued after the armistice was signed and the cease-fire order was issued.

The neuropsychiatric treatment center which served Korea in the combat days has continued its operations in the postcombat period to the present. It has remained in the same location and the same rather crude housing facilities; these consist of tents, with quonset huts for the clinic and disturbed ward. It has retained the only evacuation authority for moving neuropsychiatric cases from Korea excepting cases considered as emergencies. It has received its evacuees from the division area in the same fashion as before, but without the pressures and threats of enemy attack affecting treatment regimens and the management of their cases. The policy of maintaining the environment of the psychiatric treatment facilities in both the Army and division areas as much like those of the patient's units as possible, which was so needed and beneficial during the combat period, was in essence carried over into the postcombat period for tactical as well as therapeutic reasons. The milieu, therefore, in which psychiatric patients were treated in the postcombat period remained basically unchanged from that of the combat period, except that the stresses as well as the supporting factors of the "fire fight" were missing.

### COMPARATIVE STRESSES

In combat, fear is the dominant stimulus in producing emotional disabilities. Mounting casualties, lengthening duration of combat activity, military reverses, lack of motivation, poor indoctrination, unrecognizable goals, and lack of confidence in weapons and leaders all conspire to dissolve the "feelings of invulnerability" usually experienced by the soldier after his "baptism of fire," and to subject him to the insidious ravages of fear. Fear—of mutilation, death, capture, cowardice, failure to support his buddies, of being responsible for the death of a buddy, and of insanity—gnaws on the tense emotional strings which hold his personality in a tenuous equilibrium. Often visions of family

suffering caused by his death haunt the exhausted soldier. The Chinese, fully aware of the crippling psychologic and physiologic effects of fear, employed bugles, whistles, and cymbals to instill fear into their enemies as was done in ancient times by armies engaged in battle. In modern warfare air attack, artillery fire, and chemical warfare are the most potent producers of fear stimuli. The Chinese, lacking the fire power of their opponents, often used more primitive means of producing fear stimuli, often with deleterious effect. These are some of the external stresses which may produce the nervous breakdown in battle.

The terrors of battle are obvious in their potentialities for producing psychic trauma, but troops removed from the rigors and stresses of actual combat by the Korean armistice, and their replacements, continued to have psychiatric disabilities, sometimes approximating the rate sustained in combat, as in the psychoses. Other stresses relegated to the background or ignored in combat are reinforced in the postcombat period when time for meditation, rumination, and fantasy increases the cathexis caused by such stresses, thereby producing symptoms. Absence of gratifications, boredom, segregation from the opposite sex, monotony, apparently meaningless activity, lack of purpose, lessened chances for promotion, fears of a renewal of combat, and concern about one's chances in and fitness for combat are psychologic stresses that tend to recrudesce and to receive inappropriate emphasis in an Army in a position of stalemate.

Rotation policies create in some soldiers a feeling that the men in the Army are exploited in comparison with those in the other services; for example, Air Force personnel serve one year in Korea and marines 14 months, whereas the soldiers in the Army are obliged to serve 16-month tours in Korea. Many of their United Nations comrades are obligated to serve only one year in Korea even though they traveled farther to get to their overseas assignments.

Food, shelter, bathing facilities, sanitation, and recreation facilities, while much improved over those available in the combat period, are far below the standards to which the men were accustomed at home. Physical fitness, proficiency with weapons, and maintenance of equipment and weapons must be continuing preoccupations of a ready and alert armed force. Only too often maintaining a state of readiness appears to be a fruitless, aggravating, and irritating annoyance to many who do not understand or cannot accept its imperative necessity. In the combat situation the poorly motivated and indoctrinated are carried along by the necessity for group identification and communication, whereas the condition of combat readiness affords less cohesive sociologic forces.

Sympathy of the home folks with their men in battle often spares the soldier from the problems at home. The soldier in an occupation Army has no such immunity. Not only important issues but also the petty problems, annoyances, and frictions at home are relayed on to him. Distance often prevents the soldier from offering any specific action or help, and his frustration in this respect only serves to arouse his repressed hostilities. Domestic problems at home are often reflected in behavior problems in soldiers, particularly those of immature personality or with character defects. Minor inconveniences are often interpreted as discrimination or even persecution, an attitude that jeopardizes the soldier's adjustment in his group. Neurotic tendencies may progress to somatic reactions and the compulsive may show overt anxiety. Irritations that would be ignored by the soldier engulfed in the heat of battle may make a considerable impression on the soldier occupied with tedious, routine duties. Thus, the need for psychiatric assistance for troops manning the redoubts of a demilitarized zone in an uneasy truce may be almost as essential as in combat.

#### COMPARATIVE SUPPORTS

Unit morale is perhaps the greatest factor influencing the morale of the individual in combat. The factors influencing unit morale, though sometimes intangible, are sufficiently powerful to keep a considerable proportion of the troop well motivated.<sup>7</sup> Unit morale entails mutual support from buddies and willingness to sacrifice for them. It is a sustaining force or emotional bond engendered in individuals who share common dangers, hardships, and deprivations. All successful combat units possess it in its positive manifestation. It is the result of the strong group identification of its individual members. The loneliness, desolation, and treachery of the battlefield bring men closer, not only emotionally, but also for mutual protection, seemingly as a spontaneous reaction. The strong bonds of friendship formed and welded on the battlefield resemble the love found in a closely knit family group. Much of the self-love present in all of us under these conditions is displaced into concern for the group with a consequent reduction in anxiety regarding self and an increased tolerance for battle stress.

In battle, when a man's life might well depend upon the decision of even his immediate superior, leadership assumes an importance of a magnitude not found in the training camp or even in the unit guarding a demilitarized zone. The effects of leadership are so frequently apparent in the Army as to drive home the simple fact that if a leader meets the emotional needs of his men adequately they are greatly supported against personality disturbances.<sup>8</sup> As a father figure this leader is expected to sup-

ply a large portion of the emotional and physical needs of his men. By his personal concern for his men, his warmth and understanding, and his prestige position in the military social structure, he wins their co-operation, loyalty, respect, and affection, and is thereby enabled to enforce discipline of the group. Failure to establish himself as an authoritative figure prejudices his success as a leader. The discipline of a military unit is not the discipline of a prison, for in the former situation it is a sign of morale and conformance is spontaneous, while in the latter case discipline is hardly associated with a high state of morale. Discipline in the battle situation is recognized by the soldier as an essential for combat efficiency and a factor in his survival as well, so he can more easily submerge his individual desires for the common good.

If one considers the soldier's motivation to be his conscious attitude toward his assignment, one can readily see that combat circumstances arouse stronger motivating forces in troops than are likely to occur in an occupation or stand-by status. The atrocities committed by the enemy in the early days of the Korean campaign were common knowledge on the battlefield and tended to inculcate hatred of the enemy. This hatred served to reinforce positive motivation and to dull the effects of fear-producing stimuli. The attitude of the soldier in the Korean conflict toward the enemy was similar to that of the soldier who fought in the Pacific in World War II where hatred of the enemy was a powerful incentive to fight and endure hardship, deprivation, and suffering in order to wreak vengeance upon the foe. In the psychologic preparation of a soldier for battle, the indoctrination of hate is considered highly desirable but difficult to inculcate in the American soldier with his cultural background so different from the youth of many foreign lands. But the treachery and the cunning of the enemy in the Korean campaign and the atrocities they committed soon overcame the deeply ingrained inhibitions against hate. In this way, the inner defenses against anxiety of the soldier were reinforced.

No such forces are available to the soldier in the unit in a state of combat readiness guarding his side of the demilitarized zone. Nor are there opportunities for him to discharge his hostilities against those he holds responsible for his predicament, such as by firing his weapon at the enemy. While Marshall,<sup>9</sup> in his studies of soldiers in combat in World War II, found that only 15 to 25 percent of individual soldiers fired their weapons, there is little doubt that the opportunity to fire a weapon against an enemy can help relieve the tenseness built up in battle.

Morale, group identification, motivation, leadership, and attitudes all play a role in supporting the soldier and allaying the

Sympathy of the home folks with their men in battle often spares the soldier from the problems at home. The soldier in an occupation Army has no such immunity. Not only important issues but also the petty problems, annoyances, and frictions at home are relayed on to him. Distance often prevents the soldier from offering any specific action or help, and his frustration in this respect only serves to arouse his repressed hostilities. Domestic problems at home are often reflected in behavior problems in soldiers, particularly those of immature personality or with character defects. Minor inconveniences are often interpreted as discrimination or even persecution, an attitude that jeopardizes the soldier's adjustment in his group. Neurotic tendencies may progress to somatic reactions and the compulsive may show overt anxiety. Irritations that would be ignored by the soldier engulfed in the heat of battle may make a considerable impression on the soldier occupied with tedious, routine duties. Thus, the need for psychiatric assistance for troops manning the redoubts of a demilitarized zone in an uneasy truce may be almost as essential as in combat.

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Morale, group identification, motivation, leadership, and attitudes all play a role in supporting the soldier and allaying the

effects of anxiety-producing stimuli. Incentives, orientation, religious faith, esteem, and affections probably play a lesser but nevertheless positive role in maintaining the equilibrium of the personality under stress. These factors are also operative in troops in an occupation or stand-by basis.

### STATISTICAL ANALYSIS

Data studied have been extracted from monthly divisional and hospital reports. The statistics to be presented for the Korean operation were compiled from reports submitted directly from psychiatric facilities in field and hospital installations and were originally instituted to reflect psychiatric trends or problems developing in divisional or geographic areas of the combat zone.<sup>4</sup> Many cases recorded in official statistics are not of sufficient severity to warrant transferring the patients to a psychiatric facility; consequently these figures are not identical with official statistics of the Department of the Army. Rates are expressed as number of cases per 1,000 of troop strength per annum, both for security reasons and to maintain a constant baseline. Hanson and Ranson<sup>10</sup> devised such a reporting system in the Mediterranean Theater in World War II, and the reporting system for the divisions in Korea is a modification of their original plan.

An exception to this reporting method is the statistics obtained from Eighth Army Provost Marshal records for the year 1953, which show crimes of violence, narcotics violations, and suicides. They record only the major offense for which the arrest was made. Multiple offenses committed concurrently by the same individuals are not included.

Following cessation of hostilities, divisions moved their main line of resistance back about two miles in compliance with the terms of the cease-fire agreement. Geographic and climatic conditions would, therefore, not influence divisional rates from what they were in the first half of 1953, when the combat situation was rather stable except for constant patrol actions and localized vicious attacks by the enemy in an attempt to straighten out his lines prior to the signing of the armistice. It was not until near the end of the first year postcombat that Republic of Korea troops began replacing American divisions on the line.

It can be seen in figure 1 that the total incidence rate of 34 per 1,000 troop strength per annum for American divisions in Korea in the first half of 1953, which includes outpatients, compares exceptionally well with the incidence rates of American troops in Europe in World War II, which, for the period from June 1944 to May 1945, were reported as 101, 84, and 71 for the First, Third, and Fifth Armies respectively.<sup>4</sup> The World War II figures exclude neuropsychiatric outpatient treatment, which was practically nonexistent at that time.

May 1956)

Using in the first year postcombat the same evacuation criteria, channel and echelon system for evacuation, and treatment as were employed in Korea during combat, the psychiatric incidence total rate for divisions fell to 25.8 per 1,000 per annum. This drop of 24 per cent may have resulted from better screening in forward medical installations, from a reduction of stresses to which the men were subjected, or from a combination of both.

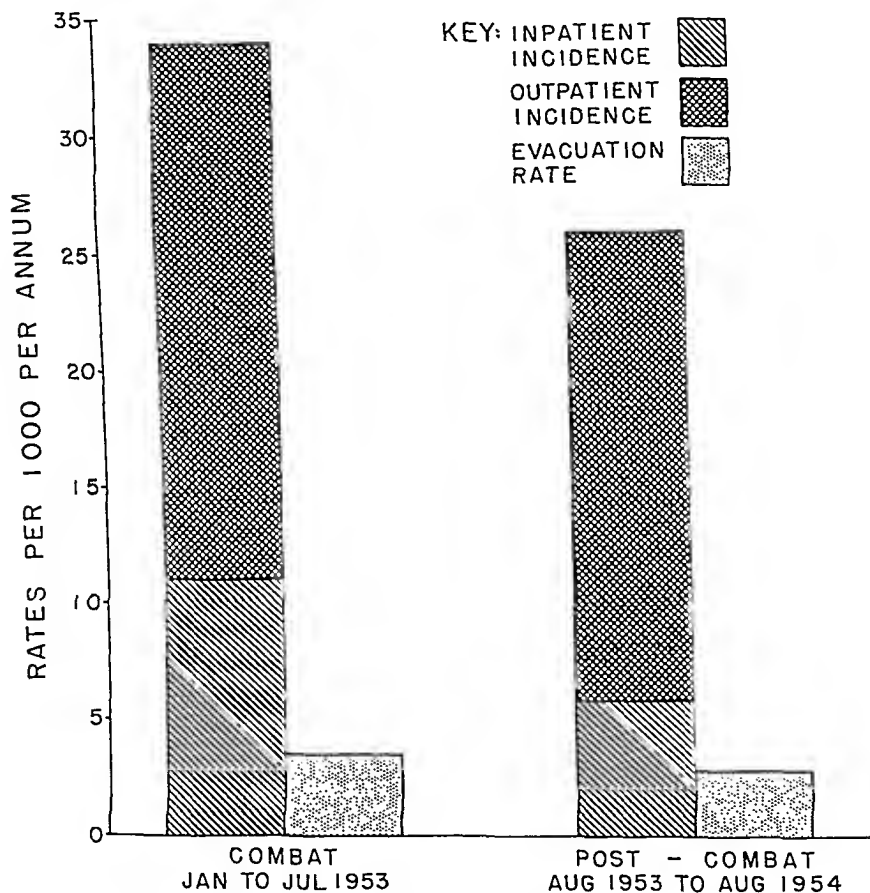


Figure 1. Psychiatric incidence and evacuation rates for divisions in Korea from January 1953 to August 1954 (cease fire—27 July 1953).

A logical conclusion is that both played some role. Less stress could produce not only fewer psychiatric syndromes but also less severe presenting symptoms; thus fewer patients would require referral to divisional psychiatric treatment facilities. It is to be noted that in the combat period 3.4 per 1,000 per annum of troops were evacuated from the division area for psychiatric conditions, as compared to 2.8 per 1,000 per annum evacuated in the post-combat period. Percentagewise the evacuation rate during the combat period was 21 per cent higher than the postcombat period.



Sixty-eight per cent of all patients reaching divisional psychiatric facilities in the combat period were treated as outpatients as compared with 77 per cent in the postcombat period.

Figure 2 is a graphic portrayal of the effects of battle on the production of severe psychiatric casualties requiring inpatient

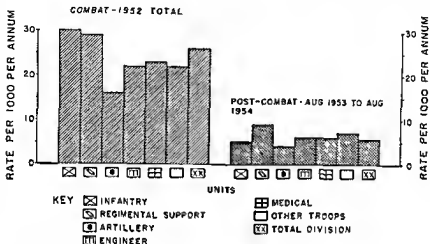


Figure 2. Comparison of psychiatric inpatient rates in divisional elements, U. S. Army, Korea, for combat and postcombat periods (cease fire—27 July 1953).

treatment. This reduction, as one would expect, is most sharply reflected in the infantry, which in battle is required to come to grips with the enemy. Artillery, engineer, and even medical troops, who are more exposed to enemy fire than are support and headquarters troops, also show a more marked reduction in incidence rates. These comparative rates reinforce the thesis that in spite of potent emotional supports for the personality in battle, the destructive forces of fear and anxiety generated in battle far outweigh the supports in potency and effects upon the ego structure.

The ratio of nonpsychotic to psychotic patients evacuated from a given military operation mirrors the efficacy of psychiatric effort in the zone, particularly with respect to the utilization by the military of neurotics and other nonpsychotic individuals with emotional problems. Figure 3 shows how the reversal of the ratio of nonpsychotic to psychotic evacuations, which began in 1951 when psychiatric operations became organized, integrated, and effective, continued into the postcombat period. At the same time, delaying, withdrawal military tactics ceased. Figures for the Mediterranean Theater in the first half of 1944 are given for comparison.

Figure 4 is a record of offenses—crimes of violence, narcotics violations, and suicides—committed by personnel of the Eighth Army in Korea in the calendar year 1953. Although the actual

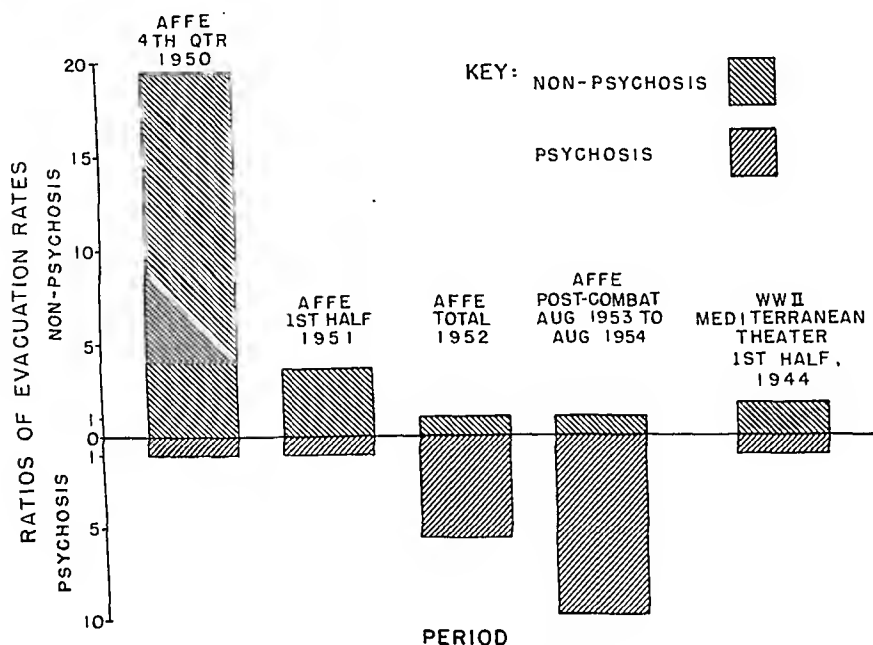


Figure 3. Comparison of ratios of psychiatric evacuation rates (psychosis vs. nonpsychosis) between Army Forces Far East, 1950-1954, and Mediterranean Theater, 1944.

OFFENSES		FIRST 6 MO. 1953	LAST 6 MO. 1953
CRIMES OF VIOLENCE	AGGRAVATED ASSAULT	82	80
	MURDER	35	9
	VOL. MANSLAUGHTER	3	5
	ROBBERY	6	10
	RAPE	9	7
NARCOTICS - POSSESSION OR USE		84	41
SUICIDE		16	17

Figure 4. Criminal offenses among Eighth U. S. Army personnel in Korea during 1953 (cease fire—27 July 1953).

cease-fire order became effective on 27 July 1953, the table nevertheless gives a fair comparison of offenses covering approximately a six months' period before and after the cease-fire order. One would surmise that crimes of violence might increase after the armistice when the men would not be able to release their hostilities by aggressive acts against the enemy, but this is not borne out by these statistics. In the postcombat period murders were about one fourth as common and arrests for narcotics violations were about one half as frequent as in the combat period.

### SUMMARY

The armistice situation in Korea afforded a unique opportunity to compare the incidence and severity of psychiatric syndromes in combat troops with troops in a state of combat readiness. Climatic and geographic conditions under which troops lived did not change during the periods studied. Neither did evacuation criteria, methods, and therapeutic practices change essentially in any way.

Destructive and supporting psychologic factors effecting troops in combat and in a state of combat readiness were discussed, and statistics were presented which showed that the stresses of battle far outweighed the internal and external supports that the soldier could muster to counteract them. Battle stress was shown to directly affect psychiatric incidence, evacuation, and hospitalization rates, which were substantially increased during the combat period. Psychiatric incidence rates in divisions were approximately 25 per cent higher during combat. Murders were about four times more common and narcotics violations about twice as frequent in the combat period as in the postcombat period.

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## Obstructive-like Jaundice Secondary to Chlorpromazine Therapy

ROBERT T. GANTS, *Colonel, MC, USA*

WILLIAM R. SHADISH, *Major, MC, USA*

**C**HLORPROMAZINE HYDROCHLORIDE (Thorazine hydrochloride) has become increasingly popular in the various fields of medicine. Its effectiveness has been noted in the control of acute and chronic states of psychotic excitement.<sup>1-4</sup> Intractable nausea and vomiting are often amenable to chlorpromazine therapy,<sup>5</sup> and its use in analgesic problems is well known.

Like most other pharmacologic substances the drug has some undesirable side effects. This case report is an example of one of the more serious complications—that of hepatocellular jaundice with obstructive-like findings during the administration of the drug. A major surgical procedure was undertaken because of inability to differentiate the condition from that of obstructive-type jaundice. As a result of knowledge gained from this case another patient with similar findings was saved from an unnecessary operation.

### CASE REPORT

A 40-year-old woman was admitted to the neuropsychiatric service of this hospital with the diagnosis of manic-depressive psychosis. Physical examination was essentially normal. Chlorpromazine, given orally, was prescribed in a dosage of 25 mg every six hours. The dosage was changed to 50 mg three times daily for 17 days for a total of 2.5 grams. On the 15th day after initiation of chlorpromazine therapy, the patient developed a mild chill and symptoms of general malaise associated with a temperature of 104°F (oral). Repeated cellular examinations of the peripheral blood were normal and the sedimentation rate remained at approximately 30 mm/hr during the entire hospitalization. One hundred and eighty milligrams (300,000 units) of procaine penicillin were given intramuscularly daily. Within three days the patient's temperature was normal. On the 20th day she complained of epigastric distress, and two days later there was icteric discoloration of the scleras and skin. The serum bilirubin (total) was 7.8 mg per 100 ml at that time, and an examination of the urine was positive for bile. Her stools were a brownish-gray color, negative for bile, and positive for blood by the Guaiac test.

From Walter Reed Army Hospital, Washington, D. C.

Careful questioning of the patient and her relatives did not reveal any history of previous hepatic disease. No causative factor, such as recent transfusions of blood or plasma, could be blamed for the jaundice. There was no history of previous gall bladder disease. Roentgenographic studies made during the course of a previous examination had revealed a normally functioning gall bladder without calculi. The liver was palpable and nontender, one fingerbreadth below the costal margin. The gall bladder was not palpable. Her abdominal organs were easily palpable because of undernourishment. Because there was a possibility that the jaundice was caused by chlorpromazine, the drug was discontinued. A roentgenologic examination of the gastro-intestinal tract by means of barium by mouth and by enema was normal, as was an intravenous pyelogram. A needle biopsy of the liver showed evidence of bile stasis which was considered compatible with extrahepatic biliary obstruction (fig. 1). Neither the gall bladder nor bile ducts were visualized after-Cholografin (brand of sodium Iodipamide) was given intravenously. The dye was excreted by the kidneys, producing a normal pyelogram. Serial liver function tests revealed that the serum bilirubin

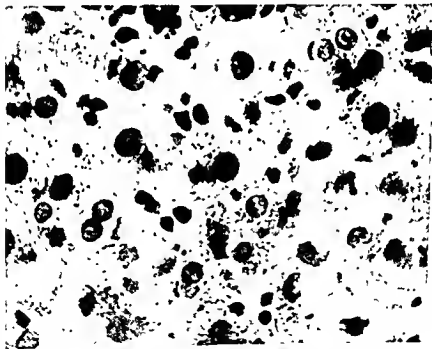


Figure 1. Preoperative liver biopsy specimen obtained with the Silverman needle. The picture is consistent with the pathologic changes seen in biliary obstruction. ( $\times 625$ )

(total) rose to 14.2 mg per 100 ml and the alkaline phosphatase levels to 15.9 Bodansky units. The prothrombin time, cephalin-cholesterol flocculation, and thymol turbidity determinations remained normal. The

icteric tint of the scleras and skin was increasing. In view of these findings a clinical diagnosis of obstructive jaundice was considered.

Twenty-eight days after the onset of jaundice an exploratory laparotomy was performed. The gall bladder was small and collapsed. The liver was of a greenish color and slightly smaller than normal. The common bile duct was not distended, and palpation of the extrahepatic ducts, pancreas, and duodenum was normal. A choledochotomy, including exploration of the common bile duct and left and right hepatic ducts, revealed no abnormality. A cholangiogram at time of operation showed no evidence of extrahepatic biliary obstruction (fig. 2). A measurement of the bilirubin content of bile obtained from the duct at



*Figure 2. Cholangiogram obtained during operation, 28 days following onset of jaundice. The gall bladder and biliary tree filled completely and showed no evidence of obstruction.*

this time was 2.4 mg per 100 ml (normal values for bilirubin content of bile in the common duct vary between 17 and 71.4 mg). A duodenotomy was performed and a careful gross examination of the tissue in the region of the ampulla of Vater was normal. This was confirmed by a subsequent report on biopsy specimens. The duodenum was closed in

a transverse manner using two layers of fine sutures. A T-tube was placed in the common bile duct with the long arm being brought out through a stab wound in the right flank area. Prior to closure of the abdomen a large-size liver biopsy specimen was obtained.

Examination of the liver tissue obtained at operation revealed the normal lobular architecture to be preserved. There was marked bile stasis with bile thrombi in the central zone of the lobules, an occasional minute focus of liver cell necrosis in the midzone, a moderate degree of pleomorphism of liver cells, and a pericholangitis of moderate intensity. The bile ducts were empty and free of cellular exudate, bile thrombi, or any other foreign material. Their lumina were, in general, collapsed and there was no evidence of any undue bile duct epithelial hyperplasia or proliferation. The cellular infiltrate of the periportal fields was composed predominantly of mononuclear cells, histiocytes and lymphocytes, with an admixture of a small number of segmented leukocytes. These findings were considered as being consistent with the histopathologic picture as seen in jaundice due to chlorpromazine therapy (fig. 3).

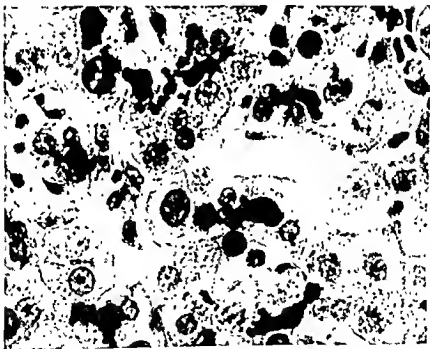


Figure 3. Liver biopsy specimen obtained during exploration on 28th day after onset of jaundice, showing on microscopic section the liver findings of central lobular bile stasis and bile thrombi ( $\times 625$ )

The patient's postoperative course was complicated by mild mental depression and weakness. Her improvement was gradual, and she was





## COMMENT

The incidence of jaundice following chlorpromazine administration is a relatively uncommon complication. There are reports of three patients having been operated on because of signs and symptoms of obstructive jaundice.<sup>6-8</sup> In table 1 the inconsistency of the low incidence of jaundice among the 500 cases reported by Moyer and associates<sup>1</sup> is shown. However, only 55 of their patients were given the drug for more than five days. In the majority of patients in whom jaundice was reported as a side effect, the icterus occurred within 14 to 21 days after initiation of therapy. It is notable that the dosage before onset of jaundice varies greatly, one of the patients reported by Loftus and associates<sup>7</sup> having received a total of only 400 mg. It is presumed that the incidence of jaundice due to chlorpromazine therapy over a prolonged period is from 1 to 4 per cent.

TABLE 1. Incidence of jaundice during chlorpromazine therapy

Authors	Total cases in series	Incidence of jaundice		Duration of therapy at onset of jaundice
		Number	Per cent	
Lehmann and Hanrahan <sup>2</sup>	71	3	4.2	2 weeks (case 1) 3 weeks (case 2) 4 weeks (case 3)
Winkelman <sup>4</sup>	142	3	2.1	2-5 weeks
Zatuchni and Miller <sup>3</sup>	Not stated	1	—	14 days
Van Ommen and Brown <sup>4</sup>	Not stated	3	—	3 weeks (case 1) 19 days (case 2) 21 days (case 3)
Moyer and associates <sup>1</sup>	500+	1	0.2	14 days
Azima and Ogle <sup>1</sup>	100	5	5	17-21 days
Loftus and associates <sup>7</sup>	Not stated	4	—	27 days (case 1) 16 days (case 2) 23 days (case 3) 12 days (case 4)

The morbidity is varied, the duration of jaundice existing from a few weeks to seven months. No deaths due to chlorpromazine have been reported. However, Boardman<sup>9</sup> reported a patient being treated with chlorpromazine who died in auricular fibrillation and had a number of other complications that could have accounted for the death.

According to Winkelman,<sup>4</sup> Harper reported that in a few patients in whom administration of chlorpromazine was discontinued because of jaundice, the drug was given again when the jaundice had subsided, and was tolerated without recurrence of the disorder.

### SUMMARY AND CONCLUSIONS

Jaundice, obstructive in type, occurred in a patient who had been taking chlorpromazine therapeutically for three weeks. There is extreme difficulty in differentiating jaundice from this cause from that of extrahepatic biliary obstruction. The only evidence in this case that the jaundice was nonobstructive was a negative Courvoisier's sign. Chlorpromazine is being used extensively as a therapeutic drug and has been extolled as a "wonder drug" in the lay press. One popular lay magazine mentioned this complication as being relatively innocuous. At the present time there are no laboratory procedures or definite physical findings to aid the surgeon in determining the cause of the icterus in such a case. A history of chlorpromazine ingestion prior to the onset of icterus, plus laboratory findings of obstructive jaundice, and the microscopic findings on needle biopsy of the liver, should cause deferment of surgical exploration.

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# Fetal Hydrocephalus, Face Presentation and Spontaneous Rupture of the Intact Uterus

JOSEPH J. ROVINSKY, *Captain, USAF (MC)*

**T**HE INCIDENCE of fetal internal hydrocephalus varies from 1:370<sup>1</sup> to 1:2,000<sup>2</sup> deliveries. The incidence of persistent face presentation ranges from 1:369<sup>2</sup> to 1:529<sup>3</sup> deliveries. The following case report presents both complications in a single pregnancy; the pregnancy also terminated in the spontaneous rupture of the intact uterus during labor.

## CASE REPORT

A 24-year-old white para 1 was first seen in the obstetrical clinic of this hospital on 16 May 1955, at 14 weeks' gestation. Her last menstrual period was 4 February and the estimated date of confinement, 11 November. At this time she had no complaints except for the common problems of nausea and urinary frequency so often associated with early pregnancy. During her childhood she had had mumps, measles, chickenpox, and whooping cough; a tonsillectomy and adenoidectomy at six years, and an appendectomy at nine years. The family history was entirely negative. Physical examination revealed a normal, well-nourished, well-developed woman whose only findings were the breast changes of pregnancy and a retroverted soft uterus enlarged to the size of a three-month gestation.

Laboratory studies revealed a red blood cell count of 3,810,000 per  $\mu$ l; hemoglobin, 11.5 g per 100 ml; blood type, AB; Rh positive. Urinalysis and a serologic test for syphilis were negative. A roentgenogram of the chest was within normal limits.

The patient was followed at monthly intervals to the 34th week of pregnancy, and the only problem encountered was a tendency for blood pressure elevations up to 140/90 mm/Hg, which responded to rest and mild sedation. Total weight gain was 23 pounds, albuminuria was not present, and the diagnosis of pre-eclampsia was never entertained. At 34 weeks, the patient's repeat hemoglobin value was 13.5 g per 100 ml. She had no complaints, having experienced a comfortable pregnancy. From this point, visits were continued at weekly intervals. To prevent excess weight gain, the patient was given intermittent courses of diuretics, on one occasion ammonium chloride and on another Diamox (brand of acetazolamide), with good results.

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From U. S. Air Force Hospital, Turner Air Force Base, Ga.

The first intimation of difficulty arose in the 37th week of the pregnancy, when the examiner was unable to locate the cephalic pole of the fetus, and determined that engagement had not occurred. Pelvic measurements by x-ray at this time were: obstetrical conjugate, 14.3 cm; transverse diameter of pelvic inlet, 13.2 cm; bispinous diameter, 9.7 cm; and pubo-sacro-coccygeal diameter, 13.9 cm.

Roentgenograms showed that the pelvic inlet was anthropoid, with a curved sacrum. The fetus was in the left occiput anterior position. The fetal head was abnormal in these views. It was twice normal in size, and the skull bones were very poorly ossified. The vertex was markedly deflexed on the spine. The impression of the roentgenologist was that this was a normal female pelvis of anthropoid configuration, and that the films were suggestive of hydrocephalus and face presentation.

We decided to permit the patient to begin labor spontaneously, and to decompress the hydrocephalic vertex as soon as the cervix became sufficiently dilated.

#### Course in Labor

Labor began at 41 weeks' gestation, on 17 November, and the patient was admitted to this hospital three hours after onset of contractions. Admission temperature was 100.4°F (oral); pulse, 86/min; and blood pressure, 110/70 mm Hg. The uterus was enlarged to the xyphoid minus four fingers, and hard uterine contractions occurred every 2½ or 3 minutes, lasting from 40 to 45 seconds; the fetal heart was faintly audible in the right lower quadrant of the abdomen. The previous x-ray and clinical impression of hydrocephalus was confirmed. On rectal examination the cervix was 2 cm dilated and 50 per cent effaced. A urine test for albumin was negative.

At 0300 hours the patient was in early labor. The perineal area was prepared and a soapsuds enema was given. Roentgenographic examination reaffirmed the previous findings, now showing the wide, bulging suture lines and fontanels of the fetal vertex. The patient was now given 50 mg of Demerol (brand of meperidine hydrochloride) intravenously and 100 mg intramuscularly; and 0.6 mg of scopolamine hydrobromide intramuscularly. As a precautionary measure, and to maintain a patent venous channel, an intravenous infusion of 5 per cent dextrose in water was started.

At 0600 hours uterine contractions continued to be severe, 45 seconds in duration, and occurring every three minutes. The patient was resting well and in good condition. Her pulse was 92/min; respirations, 14/min; blood pressure, 120/70 mm Hg; and temperature, 99.2°F (oral). Rectal examination revealed progression of cervical dilatation, and it was thought that the contemplated decompression might be attempted. In the delivery room, with the patient in lithotomy position and under Pentothal (brand of thiopental sodium)-nitrous oxide-oxygen anesthesia, sterile vaginal examination disclosed the cervix to be 4 cm dilated,

80 per cent effaced, and firm. The amniotic sac was artificially ruptured, with the escape of a normal amount of clear fluid. Further examination, during which extreme care was taken not to displace the head or further distend the lower uterine segment, confirmed the impression of fetal hydrocephalus. The head was completely deflexed on the neck, in face presentation with the mentum in right posterior quadrant. The large vertex was floating completely out of the pelvis, and the nulliparous vaginal tissues made any operative procedure difficult, even with the added relaxation afforded by the use of Anectine (brand of succinylcholine chloride). With this difficulty, plus the added problem of the face presentation, it was impossible at this time to perforate the fetal head. The patient being in good condition, it was decided to await further cervical dilatation under close observation, at which time it was believed that craniotomy might become feasible.

At 0700 hours good labor continued, with contractions every 3 minutes and lasting from 35 to 40 seconds. The patient was comfortable, requiring no further sedation. Her temperature was 98.6°F (oral); blood pressure, 120/80 mm Hg; pulse, 92/min; respirations, 16/min. During the previous 15 minutes, an unusual amount of bright red blood had appeared vaginally; abdominal examination revealed no additional abnormalities. The patient was again prepared for vaginal examination. Under Pentothal-nitrous oxide-oxygen anesthesia, sterile examination revealed the cervix to be 7 cm dilated and very thin; the anterior fontanel could be reached, and cranial decompression was felt to be possible. Because of the excessive vaginal bleeding, further intra-uterine examination was carefully carried out, with the possibility of uterine rupture or cervical laceration in mind. Such a rupture was discovered along the left lateral wall of the uterus, behind the deflexed occiput, extending well into the fundus, and through which the intestines were readily palpable. The time was 0726 hours; the patient was under general anesthesia, with blood pressure at 120/70 mm Hg; pulse, 104/min; and respirations, 12/min. Intravenous administration of supportive fluids had been started with the onset of labor; 6 per cent Dextran solution was added, and whole blood ordered from the laboratory. The operating room had been preparing for a scheduled gynecologic laparotomy, and with this good fortune the patient's abdomen was opened at 0738 hours—12 minutes after the diagnosis of uterine rupture was made.

#### Operative Procedure

The abdomen was opened through a lower abdominal midline incision with utmost speed. The uterus, containing a full-term fetus, was found to be slightly dextrorotated. There were about 100 ml of bright red blood free in the peritoneal cavity, but no evidence of either profuse hemorrhage or large hematoma formation.

Attention was first directed toward emptying the uterus. After reflection of the bladder flap, the anterior wall of the uterus was opened with

a classical incision, and the fetus grasped by the lower extremities and extracted. It was necessary to extend the incision from the lower segment to the apex of the fundus to permit passage of the overdistended head. The infant was alive and gasped spontaneously. The placenta was extracted manually, and 0.2 mg of Ergotrate (brand of ergonovine maleatè) was given intravenously to control bleeding. Transfusions of whole blood had been started, and to each unit of blood were added 2 ml of Pitocin (brand of oxytocin injection) for intravenous drip.

Inspection of the uterus was then carried out. On the left lateral wall, just posterior to the insertion of the broad ligament, there was a long, ragged laceration extending from the fundus down into the cervix. The edges of the laceration, especially in the lower uterine segment, were ecchymotic and macerated. There was no sign of massive arterial bleeding, and it was evident that the left uterine artery was intact, albeit in the exact edge of the laceration. It was believed that the laceration could be repaired and the uterus conserved. The free edges of the laceration were trimmed, and closure started at the superior apex with a medium continuous locked chromic catgut suture, which of necessity encompassed the left uterine artery in its passage, bringing together both myometrium and serosal surface of the uterus. The left ureter was identified as it crossed the pelvic brim, and its course avoided in passing the suture. It was possible to close completely the serosal surface of the uterus with this suture, which effectively controlled bleeding from the laceration. A second similar suture was placed on the endometrial surface from within the uterus to approximate the remaining myometrium and endometrium. When the repair had been completed, the thickness of the uterine wall along the rupture line was equal to that at any other point. Pulsations of the left uterine artery were absent.

The classical incision in the anterior wall of the uterus was repaired in three layers in a routine manner, and the bladder flap reapproximated as high on the fundus as possible. All free blood was cleaned from the peritoneal cavity; both adnexa were found to be normal. Hemostasis was satisfactory, and the abdomen was closed in a routine manner.

The patient had remained in good condition during the entire two-hour operative procedure, never experiencing vascular collapse. She received 1,500 ml of whole blood while on the operating table, which approximately replaced the estimated blood loss. She recovered from anesthesia while in the operating room, and was returned to the ward in good condition.

#### Postoperative Course

The infant delivered during the operation was a living female weighing 3,340 grams (7 pounds 6 ounces), with a huge hydrocephalic head and a concomitant spina bifida in the thoracic spine. The infant's head measured 18 inches; the chest, 11½ inches; and the abdomen, 12½ inches in circumference, and she was 19 inches long. The infant died in the nursery 10 minutes after birth.

The patient's postoperative course was relatively benign considering the nature of the surgical procedure. A febrile reaction up to 102°F (oral) continued for 48 hours postoperatively, but responded readily to penicillin and streptomycin sulfate therapy. For the first 36 hours there was some gastric dilatation and paralytic ileus, relieved by a Levine tube and suction. By the third postoperative day intestinal motility was normal, and oral feedings were resumed. The patient's only postoperative complaint was that of colicky pain in the left flank and left side of the abdomen, which again raised the question of the integrity of the left ureter. An intravenous pyelogram, taken on the fourth postoperative day, showed normal renal function bilaterally, with no dilatation or obstruction of either ureter. Postoperative blood studies revealed a hemoglobin value of 12.5 g/100 ml and a white blood cell count of 9,600 per  $\mu$ l with a differential count within normal limits. The remaining recovery was uneventful; the skin sutures were removed on the sixth postoperative day, and the abdominal incision healed by primary intention. The patient was discharged on the eleventh postoperative day in good condition.

Two weeks later, the patient was re-examined in the gynecology clinic prior to her departure to her home in another state. She presented no complaints, and lochia was normal. Examination revealed the uterus to be involuting well, mobile, and anterior in position; both adnexa were normal. Visualization of the cervix revealed that the laceration had extended through the cervical os, and on the left lateral side of the cervical os there remained a residual gap, extending into the left fornix of the vagina. The patient was advised to have a tracheloplasty performed in a few months, and was remitted to the care of her private family physician.

To eliminate the dangers inherent in ignorance, the patient and her family were completely informed as to her condition; were advised to seek competent medical care promptly for any future obstetrical or gynecological problems, to seek out a hospital center where large blood banks and active surgical suites would make complications safer to handle; and were absolutely warned against any uterine labor contractions.

#### DISCUSSION

Internal hydrocephalus is an accumulation of cerebrospinal fluid in the ventricular system of the brain, which results in expansion of the vertex. It is a relatively rare but potentially serious complication of pregnancy. Associated fetal anomalies are common; spina bifida occurs in from 35 to 40 per cent of these cases. In all but minor cases of hydrocephalus there is marked disproportion between the fetal vertex and the maternal pelvis, and the patient is subject to all of the dangers of obstructed labor, the most serious possibility being rupture of the uterus. This danger is increased by the marked distention and thinning of the lower uterine segment in vertex presentation. The major mortality is

usually seen in undiagnosed and untreated cases. Recent figures show an incidence of ruptured uterus in these cases of 3.4 per cent, and also a maternal mortality of 3.4 per cent.<sup>1</sup>

**Diagnosis.** The diagnosis of fetal hydrocephalus is usually not easy, but is rarely missed if the possibility is actively considered. It should be suspected if on abdominal examination the vertex is floating high and feels unusually broad, if there is absence of the typical cephalic pole of the fetus (normally hard, round, and mobile), and if there is tenderness to palpation over the lower uterine segment. On roentgen examination the fetal head may seem enlarged in either vertex or breech presentation because of x-ray distortion; grave errors have resulted from misdiagnosis on this score in cases of normal pregnancies.<sup>4</sup> Classically, the following signs are helpful in the x-ray diagnosis: the relatively small face in relation to the enlarged skull; the vertex appearing globular rather than ovoid; poor ossification of the cranial bones, which may be scarcely visible, with wide fontanels and suture lines. In some cases the roentgenographic findings are not sufficient for diagnosis. Intrapartum, this diagnosis should be entertained if there is any unreasonable delay in the progress of labor—unexpected dystocia in the multipara with a good obstetrical history, or a floating vertex in the second stage despite an adequate pelvis and good uterine contractions. With cervical dilatation, vaginal examination may reveal the widened cranial sutures and the "typical" thin, elastic, parchmentlike consistency of the fetal skull. Manual intra-uterine examination may be necessary to confirm the diagnosis, but great care must be exercised to preclude rupture of the already thin lower uterine segment by this maneuver.

**Management.** The recommended management of this complication is decompression of the distended head by the use of an appropriate needle or cannula, or by perforation with Smellie scissors. In breech presentation, puncture of the after-coming head may be accomplished through the base of the skull, through the bone behind the ear, through the foramen magnum, by incision into the cervical spinal canal, or through a spina bifida. In vertex presentation the head should be decompressed as soon as the cervix is sufficiently dilated; perforation should not be delayed until full dilatation because the first stage of labor may be slow, tedious, and painful, and the uterus may rupture before this stage is completed. Labor should then be permitted to proceed in its normal course to full dilatation and delivery; Willett's or Jacobs' clamps may be used for traction on the collapsed fetal scalp to accelerate the course. In any event, constant close observation of the progress of labor is mandatory.<sup>5</sup>

**Face Presentation.** The problem of face presentation is ordinarily less serious. In these cases, the fetal neck is sharply extended



and the occiput is in contact with the fetal back. The early diagnosis of this presentation is difficult, and is usually made on rectal or vaginal examination during labor. Antepartum roentgenographic views may be suggestive. The most frequent cause of this malpresentation has always been thought to be some degree of cephalopelvic disproportion.<sup>1,4,7</sup> Sagging positions of the uterus, low implantations of the placenta, loops of umbilical cord around the fetal neck, and anencephalia have been considered less frequent etiologic factors. It has recently been suggested that secondary face and brow presentations are very rare, and that hyperextension of the fetal head, because of increased tone in the nuchal extensor muscles, was common; in etiology, face and brow presentations may thus be primary rather than secondary.<sup>4</sup>

The prognosis in face presentation has been improved by the acceptance of a more conservative management of these cases. There is an increased fetal risk inherent in the condition, probably because of the prolongation of labor. The anticipated fetal loss is about 10 per cent.<sup>2</sup> Management calls for early diagnosis and the elimination of traumatic delivery where cephalopelvic disproportion exists. In the presence of the latter, elective cesarean section should be the rule. In multiparous patients a fetus in a persistent mentum posterior presentation can usually be safely delivered by a forceps rotation and extraction; or, if the baby is very small, by version and extraction. In multiparae when neither of these courses is feasible, and in all primiparae with the fetus in a mentum posterior presentation in whom a full trial of labor has not accomplished anterior rotation of the chin, cesarean section is the safest course.

**Uterine Rupture.** Spontaneous rupture of the uterus during labor without antecedent surgical procedures or prior cesarean sections is unusual. The incidence of both primary and secondary uterine rupture intrapartum in registered patients is estimated at 1:2,000 deliveries. Fifty per cent of these ruptures occur in postcesarean section cases.<sup>2,9-11</sup> Rupture of the pregnant uterus is responsible for 5 per cent of all maternal deaths today. Only 40 per cent (17 cases out of 43 reported) of intrapartum primary uterine ruptures in one series<sup>12</sup> were spontaneous, and none occurred in primigravidae; in all almost cases there was some element of dystocia or cephalopelvic disproportion—large fetus, malpresentation, hydrocephalus—and the majority of patients presented were in the older age groups, with great multiparity. A recent resumé of this problem among South African Bantu women<sup>13</sup> presents interesting figures: The incidence of uterine rupture was 1:137 deliveries, with a maternal mortality of 32 per cent. Only 10 per cent were secondary ruptures at the site of an old cesarean section scar, and 90 per cent were primary ruptures. Spontaneous rupture of the intact uterus occurred in 68 per cent of these cases, but of these,

only 8 per cent occurred in primiparae, and 30 per cent in grand multiparae. The great variation of these figures from those accepted in this country is doubtless due to the differences in population observed and in maternal care.

The diagnosis of impending rupture of the uterus, and even of actual rupture, may be extremely difficult; the signs are those of cardiovascular collapse with abdominal pain and tenderness, but may be minimal or silent for many hours.<sup>14</sup> This one fact is responsible for many maternal fatalities. It is, therefore, imperative in the proper conduct of labor to suspect this accident where its statistical incidence is increased, and to proceed accordingly. The treatment is immediate laparotomy, and usually hysterectomy. The value of the uterus for future child-bearing, in cases where conservative repair of the uterine tear is practiced, may be questioned; repeated ruptures of such repaired scars are recorded.<sup>15, 16</sup> Yet, the report of the 50 ruptures in South Africa<sup>13</sup> where the uterus was conserved in 72 per cent of the patients coming to operation, shows that repair rather than hysterectomy must be feasible in many instances.

The combination of hydrocephalus and face presentation is fortunately very rare; in 304 cases of hydrocephalus, only three cases of brow presentation (1 per cent) and no cases of face presentation were reported.<sup>1</sup> In any term case with more than minimal hydrocephalus there is no question of normal vaginal delivery, yet one is reluctant to subject a patient to cesarean section in whom the fetal results will be so tragic.

In the case reported here, the face presentation made impossible the desired puncture of the overdistended fetal skull as early in labor as was desired; all such manipulations were further hindered by the nulliparous introitus, perineum, and cervix. The delay while awaiting further dilatation of the cervix, which at the time was not considered excessive, resulted in a spontaneous, primary, and unheralded rupture of a primigravidous uterus in the first stage of labor—another rare complication toward which the tense distention of the lower uterine segment bore a clear etiologic relationship. This case amply demonstrates all of the gravest complications of both hydrocephalus and face presentation. On hindsight it is clear that if one is again faced with this combination, cesarean section early in labor would be the course of choice.

The question of the operative management of this ruptured uterus remains to be discussed. Although the uterine tear was long and jagged, and the indication for hysterectomy urgent, there was reluctance to do this in a young primigravida. A satisfactory closure of the uterine laceration was obtained, with sacrifice of the left uterine artery in the process; the danger of compromising

the left ureter was minimized by visualizing its course. It was, therefore, compatible with the patient's immediate safety to conserve her uterus; the importance of this decision in the patient's postoperative psychologic recovery and her future mental health became increasingly evident from day to day. The physiologic question remains whether the left uterine artery, which was not transected but simply encompassed in a chromic catgut locked continuous suture, will recanalize? If not, will the single right uterine artery, sufficient with all the ancillary uterine vascular supply to maintain the nonpregnant organ, be able to supply the demands of pregnancy? Will the two uterine scars be strong enough to maintain their integrity with the distention of the organ in pregnancy? It is felt that any dangers to the mother can be minimized by close medical observation. With adequate precautions, perhaps at least one successful gestation may yet be granted this patient.

### SUMMARY

A case of fetal hydrocephalus complicated by face presentation and spontaneous intrapartum rupture of the intact uterus is presented. The problems in management of fetal hydrocephalus, face presentation, and ruptured uterus are described.

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#### EFFECTIVE OBSTETRICAL ANALGESIA

There is no substitute for a patient's confidence in her medical attendant. This is particularly true in the physician-patient relationship in the practice of obstetrics. The doctor must gain his patient's confidence early during the prenatal period. The first contact with the patient at the obstetrician's office usually cements this relationship. It is at this first visit that the seed of obstetrical analgesia is planted. Fear must be dispelled. This can be accomplished successfully by an intelligent and sincere discussion regarding the salient and pertinent points of prenatal care and labor. The patient's confidence in her physician must have been stimulated sufficiently so that upon leaving his office she believes, without a question of a doubt, that she had made the correct choice of her attendant. This is the first step toward effective obstetrical analgesia.

—HARLEY E. ANDERSON, M. D.  
 in *Nebraska State Medical Journal*  
 p. 12, Jan 1954

# Intestinal and Ureteral Obstruction Caused by An Unusual Abdominal Cyst

ERWIN A. COHEN, M. D.

**A**FTER a patient with intestinal obstruction is operated on, the exact cause is usually finally determined. In the case reported below, although the mechanism of obstruction was revealed, the specific cause is still unknown.

## CASE REPORT

A 41-year-old Filipino man, a U. S. Government worker, was admitted on 20 October 1952 with a history of generalized, crampy abdominal pains and vomiting of approximately 17 hours' duration. The abdomen became distended after the onset of the pains. He had a normal bowel movement two days before admission, and his urine output was scant on the day of admission. In 1951 he had had a short similar episode and was treated with enemas and intravenous fluids.

Physical examination was noncontributory except for the abdomen, which was distended. There was a large, firm mass occupying the lower abdomen and left upper quadrant. The mass was immobile and slightly compressible. The percussion note over the mass was flat; the rest of the abdomen was tympanitic. Auscultation revealed active and high-pitched peristalsis. There was bilateral costovertebral-angle tenderness. Rectal examination revealed a normal prostate, above which was a compressible bulge into the rectal ampulla. Blood count revealed a slight leukocytosis, and urinalysis a 1-plus albumin and a specific gravity of 1.040. A catheter inserted into the bladder after voiding produced a few milliliters of urine. Roentgenograms of the abdomen in the flat and erect positions revealed gas up to the region of the descending colon and dilated loops of small bowel, with fluid levels in both upper quadrants. In the central and lower abdomen was a homogeneous density. A Miller-Abbott tube was passed and the patient placed on intravenous fluids.

The following day, the blood urea,  $\text{CO}_2$ , and chlorides were within normal limits. The patient no longer had cramps and had a bowel movement. The Miller-Abbott tube was in the small bowel. Cystoscopy revealed a downward bulge on the dome of the bladder; indigo carmine excretion was delayed (12 minutes); intravenous pyelograms revealed normal kidneys, dilatation of both ureters down to the pelvis, and slight

lateral displacement of the lower two thirds of the left ureter. The mass was anterior to the genito-urinary system. Barium enema (fig. 1) was carried out over two hours after the intravenous pyelogram. The colon was normal. Dye was still seen in the ureters and there was a pressure defect on the dome of the bladder. At this time the Miller-Abbott tube was in the jejunum.



*Figure 1. Barium enema more than two hours after intravenous pyelogram. Note hazy area depicting abdominal mass.*

Since the bowel and ureters were partly obstructed by the mass, an operation was performed the following day. A lower left transverse incision was made. When the posterior rectus sheath was divided, the wall of the mass was seen without encountering free peritoneum. In an attempt to get above the mass in order to enter the peritoneal cavity, the incision was extended vertically in the midline. Free peritoneum was not seen, but a few small, myxomatous masses that did not communicate with the large mass were removed. Blunt dissection in this region revealed a portion of what appeared to be transverse colon intimately connected with the upper wall of the mass. Lateral exploration

revealed that the mass was in contact with the aorta and iliac vessels, but free from the kidney and upper ureter and separable from the bladder. It appeared to continue over to the right; therefore, the transverse incision was extended to the right side. After the posterior rectus sheath was divided, peritoneum was encountered in the right lower quadrant and freed from the rectus sheath. No dilated loops of bowel were seen or felt. Because the mass was intimate with the above vital structures, and seemed to be cystic, the following was done.

The area was surrounded with packs, and an incision was made into the mass. There was a gush of fluid containing small, brownish, irregularly shaped, flaky particles. Approximately 1,500 ml of fluid was suctioned; a large amount was absorbed into packs. There were eight large spheroid or dumbbell-shaped masses (up to 6 by 3 by 2 cm) floating free in the cyst (fig. 2). The surfaces were brown and velvety. One was sectioned, and contained brown gelatinoid material with numerous thin



Figure 2. Specimens removed from abdominal cyst. Courtesy of Armed Forces Institute of Pathology, Washington, D. C.

brown septa. The wall of the cyst was approximately 2 cm thick, and its inner lining was brown, slimy, and velvety. The cyst still could not be freed from the vital structures. In attempting to free it from the transverse colon, a part of the muscularis of the colon was split. This was sutured with 0000 silk. A biopsy of the wall was taken. The inner lining was coated with phenol until it turned gray; then it was cleansed with alcohol. Marsupialization was performed by joining the split edges of

the mass with the adjacent posterior rectus sheaths, leaving a defect in the center. The linea alba, anterior rectus sheaths, and lateral abdominal muscles were approximated with interrupted steel sutures. Three long pieces of iodoform gauze were packed into the cavity, the ends protruding. The subcutaneous tissues were drained and the skin was approximated with interrupted steel sutures. Routine, fungus, and acid-fast smears and cultures taken from the cyst wall at operation were subsequently reported as negative.

**Pathologist's\* Report:** "Cyst of abdominal wall, with daughter cysts, probably due to *Echinococcus granulosus* parasite infestation." Microscopic description: "In sections through the nodules stained with hematoxylin and eosin, each appears encapsulated by a moderately thick chitinous membrane. These capsules have irregular projections extending outward from their external surfaces, as if torn away from another surface. The material inside is amorphous and homogeneous, and is separated by more chitinous septa. No true cells are found. In sections through the large cyst wall, similar amorphous material is found with surrounding concentrically laminated chitinous material. A few inflammatory cells are noted." The final report from the Armed Forces Institute of Pathology was: "Abdominal cyst, type undetermined."

The patient recovered from the operation uneventfully. Bowel and urinary function rapidly returned to normal, and his wound healed promptly.

There was slight serous drainage from the cyst cavity. Within three weeks the drains were removed. Thereafter, the cavity was irrigated frequently, with the production of a few small pieces of necrotic gray material. Two weeks later, the cavity was outlined with Diodrast. It now measured approximately 9 by 5 by 4 cm in the left lower anterior part of the abdomen. Because of local infection and narrowing of the drainage tract, the cavity was unroofed a month later.

**Pathologist's Report:** "Granulation tissue with marked acute inflammatory reaction."

The organisms were sensitive to Aureomycin (brand of chlortetracycline hydrochloride). This, plus repeated irrigations, cleared the infection. Irrigations were continued on an outpatient basis. A month later it was noted that a little green, mucoid material exuded from the cavity. This was repeatedly examined microscopically and cultured, but nothing specific was found and it was thought to be a reactivation of the original process. Treatment consisted of instillations of 10 per cent silver nitrate followed in five minutes by generous irrigation with saline, with further irrigation after some hours. This was done every two or three days, and within 10 days the mucoid material ceased to appear. At this time the cavity could hold 20 milliliters.

\*First Lt. Myron E. Rubnitz, MC, USA, Pathologist



Although saline irrigations were continued the mucoid material reappeared three weeks later and was treated as above. The drainage then became blood-tinged, and less fluid was aspirated than was put in. Therefore, Diodrast was injected into the cavity (fig. 3). It ran into a small tract that connected with the transverse colon. Thereafter,



*Figure 3. Injection of sinus tract showing entrance of dye into transverse colon.*

only the superficial portion of the tract was irrigated. A later injection of Diodrast showed no communication with the colon. Follow-up examination a year later revealed that the small abdominal sinus drained a small quantity of mucoid material every two or three weeks, in between which there was no drainage. Laboratory examination of the drainage material continued to be negative. The patient feels well and is working.

#### DISCUSSION

This patient might be considered to have had a mesenteric cyst. The following types of mesenteric cysts have been de-

scribed:<sup>1</sup> (a) lymphatic cyst, (b) blood cyst, (c) hydatid cyst, (d) dermoid cyst, (e) multiple lymphatic cysts, and (f) enterogenous cyst.

There is no resemblance to a lymphatic or blood cyst since blood or lymph was not encountered. Enterogenous cysts have been described as large and as producing intestinal obstruction.<sup>2</sup> Treatment has been resection of the cyst with the contiguous bowel. However, there was no bowel mucosa in the lining and no smooth muscle in the wall. A dermoid cyst of the greater omentum has produced intestinal obstruction,<sup>3</sup> also treated by resection. This cyst does not resemble a dermoid cyst because no material resembling any germ layer was seen.

The question of an echinococcus cyst was brought to mind when the cyst was opened. This was further fostered by the initial histologic report. The relative distribution of the sites of occurrence of most echinococcus cysts are as follows:<sup>4,5</sup> liver, 57 to 74.4 per cent; lungs, 3.8 to 16.2 per cent; omentum, mesentery, and peritoneum, 1.37 to 18.2 per cent; skin, subcutaneous tissues, and muscles, 0.7 to 9.1 per cent; spleen, 1.2 to 9.1 per cent; kidneys, 1.6 to 4.74 per cent; and brain, 0.16 to 2 per cent. Rare sites(*i. e.*, bone, et cetera) have also been described. A review of cases of abdominal echinococcus-producing intestinal obstruction has revealed that the origin of the cyst in four patients was in the omentum.<sup>5-8</sup> One of these cysts was calcified and was palpated on rectal examination.<sup>6</sup> Some patients had multiple abdominal cysts occurring in the omentum, mesentery, or liver. Three cysts occupied the pelvis. In three patients the cyst was excised. Two patients did well, and one died.<sup>7</sup> In one patient the cyst was marsupialized and the patient did well.<sup>8</sup> Echinococcus cysts of the left lobe of the liver which are in the abdominal cavity and connected to the liver by a tongue of tissue have been described.<sup>6,9</sup> In a report of a case of spindle cell sarcoma arising in a pancreatic hydatid cyst<sup>10</sup> it was noted that adhesions of the cyst to the anterior abdominal wall did occur in the last stages. The preceding brought to mind that the cyst might be primary in the pancreas, whether echinococcus in origin or nonspecific. There is no support for or against a hydatid cause, and there is no evidence that it was a nonspecific cyst, because there was no history of severe abdominal trauma, abdominal surgery, or any form of pancreatitis. The Casoni test<sup>6</sup> and precipitin and complement-fixation tests are reasonably specific and valuable diagnostic aids. Unfortunately, these tests could not be done.

A case of abdominal amebic tumor producing intestinal obstruction has been described.<sup>11</sup> Treatment was with emetine, with relief of the obstruction and decrease in the size of the abdominal mass.

Bilateral ureteral compression has been described with pelvic tumors, retroperitoneal masses, and retroperitoneal inflammatory processes.<sup>12</sup> None of these has been described as associated with mechanical intestinal obstruction. An unusual case was reported of a seven-year-old boy operated on because of right lower abdominal pain and a local mass in which only a dilated ureter (the mass) and subsequently bilateral hydronephrosis was demonstrated.<sup>13</sup> With partial obstruction to a ureter it has been shown that concentration of intravenously injected dye may be seen in the upper urinary tract one to two hours after injection.<sup>14</sup>

### CONCLUSIONS

The case reported here is of interest because of the combination of intestinal and ureteral obstruction secondary to a large abdominal mass of unknown cause. The presumptive diagnosis is hydatid cyst. However, review of the slides and specimens by the Armed Forces Institute of Pathology did not reveal evidence for a more definitive diagnosis. The slides were reviewed by several parasitologists and pathologists, and nothing further was suggested except the possibility of a degenerated retroperitoneal fibroma or fibrosarcoma.

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## A MESSAGE FROM THE A. M. A.

A brief historical report appeared in the January issue of this *Journal* about the American Medical Association. Since then, successive issues have covered the responsibilities and activities of the following A. M. A. Councils: the Council on National Defense, the Council on Medical Education and Hospitals, and the Council on Medical Service. It was pointed out in one of the previous messages that 13 A. M. A. standing committees serve the House of Delegates and the Board of Trustees. They recommend policies on all activities within their jurisdiction to the Board of Trustees and the House of Delegates.

The message this month will be devoted to the Law Department of the American Medical Association. Departments differ from councils and committees in that they are essentially staff operations with the general scope of their work defined by the Board of Trustees. Their activities are administered by a director, under the supervision of the A. M. A. Secretary and General Manager.

In 1927 the Association established a Bureau of Legal Medicine and Legislation. This functioned until August 1954, when the present Law Department was organized for the purpose of consolidating all legal functions of the Association. While the former Bureau of Legal Medicine and Legislation acted primarily as a clearinghouse of medico-legal information, the Law Department acts in addition as house counsel, so to speak, for the American Medical Association.

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The Department staffs the Association's Legislative Committee, its Judicial Council, the Council on Constitution and Bylaws, and the Committee on Medico-Legal Problems. The Legislative Committee, in cooperation with the A. M. A.'s Washington Office, handles the extensive interests which the Association has in national medical legislation. The Judicial Council is the Supreme Court of the medical profession in questions of ethics; the Council on Constitution and Bylaws receives, considers, and processes proposed changes to the constitution and bylaws of the Association and to the Principles of Medical Ethics. The Committee on Medico-Legal Problems, which is composed of experts in the field of forensic medicine, considers those aspects of medical science which may be utilized in the better administration of justice. This Committee has pioneered in the development of chemical tests for

From the Council on National Defense of the American Medical Association. The views and opinions expressed are not necessarily those of the Department of Defense.  
—Editor.

intoxication and blood grouping tests in disputed paternity proceedings, as well as in the prevention of malpractice. It is continually stressing the importance of substituting a medical examiner system for the antiquated coroner system.

The function of "house counsel" also includes being available to the House of Delegates, the Board of Trustees, and the various councils, committees, and departments appointed by them. The Law Department also acts as legal counsel in business matters and litigation affecting the Association.

In the field of legal medicine, the Law Department maintains a comprehensive file of information concerning the application of law to the many affairs of organized medicine and individual physicians. A library has been assembled on a wide variety of medical subjects which have been litigated in the courts. These briefs are available on a loan basis. The topics embrace medical licensure, including the scope of sectarian practice, basic science requirements, hospital staff membership, corporate practice of medicine, various aspects of professional liability, disciplinary actions by medical associations, and others.

The area of interest of legal medicine includes consideration of everyday matters such as contracts in restraint of practice, forms of consent in connection with operative procedures; the use of tissue in human homologous transplants, and matters of taxation. More abstract but equally important items to which the Department devotes attention include questions concerning the legal aspects of artificial insemination, the study of methods to correct abuses in the field of medical expert testimony, and the general improvement of relations between medicine and the law.

The Law Department, in its efforts to develop better rapport between medicine and law, recently conducted three regional medico-legal symposia where doctors and lawyers explored and attempted to resolve areas of misunderstanding which adversely affect the best interest of the individuals they serve in their respective professional capacities. A special feature of these symposia was a two-part demonstration showing the proper and improper methods of preparing and examining the medical expert witness in a personal injury action. The demonstration has since been presented on numerous occasions to audiences composed of doctors or lawyers, or both.

This series of articles, to acquaint physicians in uniform with the organization, function, and purpose of the American Medical Association, will be continued in the next and subsequent issues of the *U. S. Armed Forces Medical Journal*.

## DEATHS

- GREENBERG, Harry, First Lieutenant, MC, USAR, of Los Angeles, Calif.; stationed at 16th Army Field Hospital, Germany; graduated in 1953 from the University of Geneva Medical School, Geneva, Switzerland; commissioned a First Lieutenant 8 June 1953; ordered to active duty 3 September 1953; died 7 February 1956, age 31, in Germany, of rheumatic heart disease.
- KENDRICKS, Edward James, Brigadier General, USAF (MC), of Royal Oak, Mich.; stationed at School of Aviation Medicine, Randolph Air Force Base, Tex.; graduated in 1922 from Northwestern University Medical School, Chicago, Ill.; commissioned a Second Lieutenant 31 July 1930; ordered to active duty 1 October 1930; died 17 February 1956, age 56, at Randolph Air Force Base Hospital, of myocardial infarction.
- KILROY, Sadie Elizabeth, Captain, ANC, USAR, of Ottawa, Ontario, Canada; stationed at U. S. Army Hospital, Fort Leonard Wood, Mo.; graduated in 1931 from the Buffalo City Hospital School of Nursing, Buffalo, N. Y.; commissioned a Second Lieutenant 11 March 1942; ordered to active duty 1 July 1942; died 23 February 1956, age 49, at Fort Leonard Wood Army Hospital, of a cerebral hemorrhage.
- LEWIS, Roy Donald, Commander, MSC, USN, of New Orleans, La.; stationed at Headquarters, Eighth Naval District, New Orleans, La.; entered the naval service 5 February 1923; died 10 March 1956, age 50, at his home in New Orleans.
- SINE, Amot Crawford, Lieutenant Colonel, MC, USA, of Silver Spring, Md.; assigned to the Office of The Surgeon General, Department of the Army, Washington, D. C.; graduated in 1941 from the State University of Iowa College of Medicine, Iowa City, Iowa; appointed a First Lieutenant, USAR, 1 June 1941; commissioned a Captain in the U. S. Army, 12 January 1943; died 1 January 1956, age 41, at his home in Silver Spring.
- SMITH, Howard Carlton, Captain, DC, USNR, of Pasadena, Calif.; stationed at U. S. Naval Air Station, Corpus Christi, Tex.; graduated in 1919 from Tufts College Dental School, Boston, Mass.; appointed a Lieutenant Commander and ordered to active duty in 1942; released to inactive duty in May 1946; returned to active duty October 1950; died 5 February 1956, age 59, at Corpus Christi.
- TURBINI, Lauro Joseph, Captain, DC, USN, of West Newton, Mass.; stationed U. S. Naval Air Station, Quonset Point, R. I.; graduated in 1927 from the Tufts College Dental School, Boston, Mass.; commissioned a Lieutenant (jg) 29 July 1931; died 8 March 1956, age 53, in Chelsea, Mass., of pulmonary edema.
- VINCENT, Burnell Wayne, Captain, DC, USN, of Norfolk, Va.; stationed at U. S. Naval Hospital, Portsmouth, Va.; graduated in 1934 from the Kansas City-Western Dental College, Kansas City, Mo.; appointed a Lieutenant (jg) in the U. S. Naval Reserve 6 June 1938; ordered to active duty 1 April 1941; transferred to the Regular Navy in 1946; died 24 February 1956, age 48, in Portsmouth, of myocardial infarction.
- ZANDAN, Jacqueline Claire, Second Lieutenant, ANC, USAR, of Springfield, Mass.; stationed at Madigan Army Hospital, Tacoma, Wash.; graduated in 1953 from the Columbia University School of Nursing, New York N. Y.; commissioned a Second Lieutenant and ordered to active duty 15 December 1954; died 17 February 1956, age 24, at the Madigan Army Hospital.

## EDITORIAL

*The U. S. Armed Forces Medical Journal has obtained from the New York Times permission to reprint a leading editorial from their Sunday edition of 11 March 1956. It is of particular interest to physicians and dentists and doubly so to those of you who are stationed in the less fortunate parts of the world as described in the article. It goes deep into the roots of unrest in various parts of the world, and as you read the article you will understand that some of the primary elements of this unrest are due to disease, poverty, and lack of food. I am sure you will agree that the New York Times is to be congratulated on this editorial and on pointing out that these problems are very much to the fore in our thinking. For example, this is one of the reasons why we have an Interdepartmental Committee on Nutrition; this is why we are studying nutritional problems in these countries and trying to help in their solution; this is why the Department of Health, Education, and Welfare is assigning its medical officers to the International Cooperation Administration to work with the governments of these various countries; and this is why the Department of Health, Education, and Welfare is lending its medical officers to the World Health Organization in cooperation with private groups such as the Near East Foundation and others, to help in bringing better health and conditions of living to these nations, as well as to bring about an understanding of the desire on the part of the United States to share our manifold blessings and opportunities.*

*I commend this editorial to all of you.*

*Frank B. Berry*  
FRANK B. BERRY, M.D.  
Assistant Secretary of Defense  
(Health and Medical)

## RUSSIA DIDN'T INVENT FLIES

The eight SEATO foreign ministers who were meeting at Karachi last week adjourned with the reluctant reminder that there was no "convincing evidence" that the Russians had abandoned their "efforts to subvert, weaken and overthrow" other peoples' governments. We need to be so reminded. The Soviet purpose has not changed. If for one reason or another—including our concentrated efforts to defend ourselves by retaliatory measures—Moscow has abandoned the use of naked force, it is employing other methods for the same objective.

But the world is not so simple that we can save it by force of arms or by making faces at the Russians. The Russians are taking advantage of a period of majestic and confusing change, but in spite of the revolutionary aroma with which they have surrounded themselves, they did not cause the change.

The world's trouble spots are almost exclusively inhabited by people with certain common characteristics: they have ceased, or are trying to cease, to be colonially exploited; God made them brown or yellow or black or red rather than white; they are poor; they are not well fed or well housed; they don't feel well, and they live a comparatively short time.

This is true in Iraq and Iran, in Lebanon, Jordan and Syria, in Saudi Arabia and Egypt and along the shore westward until we come to Tunis, Algeria and Morocco; in the Far Eastern countries which SEATO cultivates, where the Colombo Plan flourishes and where liberty appears in an unaccustomed and inexperienced guise. There is a mixture of politics, of technological backwardness, of resources not fully used, of human labor wasted, of human vitality kept down by hunger and disease.

Wherever these conditions prevail there appears in some sort of clothes and with some form of face a little man from Moscow. We do not read about this little man as we do about Mr. Bulganin and Mr. Khrushchev and their retinue, but he is there, lavishing sympathy, which does not cost anything in rubles, and offering steel mills or comparable tools which have to be paid back in fixed installments.

Wherever there is an unhealthy fly or a lethal type of mosquito or a flea hopping around with a disease in its little insides, wherever there is too little to eat, wherever there are too many persons in one room, the little man from Moscow appears. He does not tell his new friends what things are really like in Moscow or in the country districts of Russia or in the Siberian prison camps. He tells them how things are or will be in a mythical Communist heaven.

Words are not the final answer to such visitors. For people who don't speak English or Russian our words are no better than Russian words. It is deeds that count, and a real friendship behind the deeds. It will probably be necessary for us to work miracles in the underdeveloped parts of the world. To do this we may have to forget about Russia for an hour or so at a time and put our minds on the constructive work of helping people who need help and making friends of people who need friends—and whom we need for friends.

Let us undertake this task clear-eyed. Russia did not devise the evils we are trying to cure. Russia is not responsible for the retarded economic growth, the high death rates, the unfathomable and curable misery from which more than half the human race suffers. Russia did not invent typhoid, ophthalmia, cholera and other diseases—afflictions born and spread by insects in conditions of poverty and filth. Russia didn't invent flies.

If we are to defeat communism we must give up some childish legends and concentrate on the easily available proof that a free society can do more to make mankind well and happy than anything the children of Marx and Lenin have to offer.



## CORRESPONDENCE

*To the Editor:*—Since leaving the Armed Service, I have found it both pleasurable and profitable to include your journal in my periodic "browsing" at the library. Recently, while so engaged, I found in your June 1955 issue a message by Dr. Frank B. Berry on "Spit" particularly fitting for our times. I continued to leaf through the volume more leisurely than usual, and quite by accident came upon Colonel Alfred A. Grebe's review of "Clinical Orthopaedics", Vol. IV, on page 929.

In his review Colonel Grebe states: "Garrett Pipkin uses seven pages to discuss dislocation of the carpal lunate . . . . He de-emphasizes the value of good roentgenography in the management of this injury."

For Colonel Grebe so to interpret my writing is surely my fault. I must have failed to be lucid. It was not my intention to create such an impression; and if such is being read into my statement, I want to be the first to correct it.

My actual statement is: "Many failures to make a proper diagnosis arise from dependence upon indifferent roentgenograms. Interpretation of the carpal mosaic presents problems for the expert." My authorities for this statement are the late John B. Murphy, who approached the problem in the dawn of roentgenographic diagnosis, and L. D. Stevenson from the more recent British literature. It was my intention to convey the idea to the reader that accurate diagnosis of wrist injuries had been and still continues to be a difficult problem.

I then continued: "Such difficulties (*i. e.* indifferent x-rays) could be avoided by the surgeon by a careful examination of the patient, making a clinical diagnosis, so that his case is presented to the department of roentgenography for confirmation of the diagnosis, rather than for a diagnostic survey." The patient should not be just x-rayed, and never clinically examined.

The actual title of my chapter being discussed is: "A Presumptive Test for Reduction of Carpal Lunate Dislocation". My thesis is that a clinician worthy of the name should know the status of a dislocation from a clinical examination. My "ideal" in this regard centers around a legend attributed to Sir Robert Jones. It is said that a group of ten or twelve shoulder disabilities were collected for his clinic, none of which he had ever seen; yet before any of them had the opportunity of even removing their jackets he went down the line and accurately named each disability.

I think Dr. Berry and I are talking about the same thing in our widely separated subjects. Dr. Berry says in effect that a surgeon should depend upon a sound technic and not upon an antibiotic umbrella. I say that a surgeon should be able to make a clinical diagnosis and not depend entirely upon the department of roentgenography. Dr. Berry does not state that antibiotics are not valuable; and I have not stated that roentgenograms are not of value.

I trust that this clarifies my position and that you will print my letter in your section on correspondence.

GARRETT PIPKIN, M. D.  
409 Argyle Bldg.,  
Kansas City, Mo.

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#### Fourth International Congress on Diseases of the Chest Cologne, Germany, 19-23 August 1956

The Fourth International Congress on Diseases of the Chest of the American College of Chest Physicians will be held in Cologne, Germany, from 19 to 23 August 1956 under the patronage of the Federal Chancellor Dr. Konrad Adenauer. Previous Congresses have been held in Rome, Rio de Janeiro, and Barcelona. Eighty-six countries will send representatives.

The principal subjects of discussion will be problems of coronary diseases, industrial diseases of the chest, tuberculosis, lung and heart function, and tumors of the mediastinum. This year's Congress will have special reference to the surgery of coronary diseases. The presentations will be followed by free discussion. Official languages for the Congress are: English, French, Spanish, and German.

Prof. Gerhard Domagk will be the President, Prof. J. Jacobi the General Secretary, and Prof. J. Hein the Chairman of the Executive Committee.

More detailed information may be obtained from the secretariat of the Congress: Fourth International Congress of the American College of Chest Physicians, Köln-Deutz, Germany, Messeplatz.

# Promotions of Officers

The following officers of the military medical services on active duty in the Army, Navy, and Air Force have recently received temporary promotions to the rank indicated.

## MEDICAL CORPS

ADYE, William M., Jr., Capt., USAF  
 ANDERSON, Allen W., Lt., USN  
 ALEGRE, Paul M., Lt., USN  
 ALLEN, Frank F., Lt. Comdr., USN  
 ALLEN, Edward K., Jr., Capt., USN  
 ARJE, Sidney L., Capt., USN  
 ARMITAGE, Fred W., Capt., USN  
 ASH, Harry T., Comdr., USN  
 BACON, Joseph C., Comdr., USN  
 BAILEY, William T., Jr., Lt. Comdr., USN  
 BAKER, William B., Lt., USN  
 BALLENGER, Felix P., Capt., USN  
 BAMBERG, Paul G., Capt., USN  
 BARNARD, Robert, Lt. Comdr., USN  
 BARNHILL, Bruce B., Comdr., USN  
 BARON, Joseph A., Lt. Comdr., USN  
 BARTON, Robert K., Lt. Comdr., USN  
 BAYON, Michael F., Lt., USN  
 BEAUFAY, Billy J., Capt., USAF  
 BAUTMAN, Charles R., Jr., Capt., USAF  
 BERMAN, Arthur L., Lt., USN  
 BETANCOURT, J. J., Lt. Comdr., USN  
 BEERMAN, Virgil A., Capt., USN  
 BLACK, Paul E., Comdr., USN  
 BLACK, Gilbert B., Lt., USN  
 BLACKLAND, John D., Capt., USN  
 BLACK, Louis, Capt., USAF  
 BLACK, Charles B., Jr., Lt., USN  
 BLACK, Wayne C., Lt. Comdr., USN  
 BRATMAN, Charles C., Comdr., USN  
 BRADLEY, Harry A., Lt., USN  
 BRIST, Albert, Lt., USN  
 BROOKS, Robert H., Col., USAF  
 BROOKS, Robert F., Comdr., USN  
 BRUGGER, Ralph M., Capt., USAF  
 BRYAN, Frank M., Lt. Comdr., USN  
 BURNETT, Joseph L., Comdr., USN  
 BURNETT, Louis F., Lt. Comdr., USN  
 BUTT, Theodore A., Capt., USAF  
 CAPLSON, Carl F., Comdr., USN  
 CARLSON, Frederick B., Capt., USN  
 CARTER, Horace A., Lt., USN  
 CARTER, Roy E., Capt., USAF  
 CHALLENGER, William A., Jr., Capt., USAF  
 CHENAULT, Sidney B., Capt., USAF  
 CHRISTIANSEN, David V., Lt. Comdr., USN  
 CHRISTY, Ralph L., Jr., Capt., USN  
 CLARKE, Francis M., Jr., Lt., USN  
 CLOUSE, Charles F., Jr., Comdr., USN  
 COHEN, Jerome, Capt., USN  
 COHEN, David R., Comdr., USN  
 CONLEY, John F., Capt., USN  
 COOPER, Richard C., Capt., USAF  
 COOPER, Joseph, Capt., USAF  
 CORRE, Benjamin L., Jr., Lt. Comdr., USN  
 CROFT, George E., Lt. Comdr., USN  
 CUNNINGHAM, Robert F., Capt., USAF  
 DALY, Rosalind E., Lt. Comdr., USN  
 DANEN, Hershel A., Capt., USN  
 DAVIS, Robert F., Lt. Comdr., USN  
 DEAN, Robert M., Capt., USAF  
 DEANEY, Thomas E., Lt. Comdr., USN  
 DEANEY, John L., Lt. Comdr., USN  
 DILLON, James B., Jr., Capt., USN  
 DOBBS, Robert F., Jr., Lt. Comdr., USN  
 DOBBS, Philip R., Lt. Comdr., USN  
 DOBBS, Joseph J., Lt. Col., USAF  
 DOBBS, James R., Maj., USAF  
 DOOLAN, Paul D., Lt. Comdr., USN  
 DRUMMOND, H. Robert, Col., USAF  
 DUANE, George V., Capt., USAF  
 EGAN, John T., Jr., Comdr., USN  
 ELY, Thomas S., Lt. Comdr., USN  
 ENGLE, Paul R., Capt., USN  
 ENGLISH, Charles E., Col., USAF  
 ERICKSON, Lawrence S., Capt., USAF  
 ESPEY, James G., Jr., Col., USAF  
 EVANS, Charles E. S., Col., USAF  
 EYE, Harry L., Lt., USN  
 FALVO, Samuel C., Capt., USAF  
 FARFELL, Francis D., Maj., USAF  
 FARRER, John F., Capt., USAF  
 FERNANDEZ-D'ARAU, Guillermo, Capt., USAF  
 FERRY, Andrew F., Capt., USAF  
 FIFE, Thomas E., Capt., USAF  
 FISHER, Gordon F., Lt. Col., USAF  
 FITZPATRICK, Mark J., Capt., USAF  
 FLANAGAN, John F., Capt., USAF  
 FLECK, Robert L., Comdr., USN  
 FLORENCE, Lewis, Capt., USAF  
 FOOTE, John A., Capt., USAF  
 FOX, Marvin L., Lt., USN  
 FRANKS, Glenn B., Lt., USN  
 FRIEDBURGER, Donald S., Lt., USN  
 FRISMAN, Silver, Capt., USAF  
 FUGITT, Elmer J., Col., USAF  
 FULLEN, Roger F., Capt., USN  
 GADD, Duwayne D., Lt. Comdr., USN  
 GAGG, Frederick W., Lt. Col., USN  
 GILLESPIE, Robert R., Jr., Lt. Comdr., USN  
 GINTER, George C., Jr., Capt., USAF  
 GOODMAN, Erastus G., Comdr., USN  
 GRAVES, William H., Jr., Lt., USN  
 GRAYSON, Ted L., Lt., USN  
 GREEN, Cyrus T., Lt., USN  
 GREEN, Richard S., Capt., USAF  
 GRIMMELL, John R., Jr., Col., USAF  
 GRIMM, Edgar L., Capt., USAF  
 HAGENEY, Harry M., III, Capt., USAF  
 HALL, Clifford R., Comdr., USN  
 HALL, William J., Capt., USN  
 HANSEN, Wayne S., Capt., USN  
 HARR, Ellis U., Capt., USN  
 HAVES, Byron L., Capt., USAF  
 HENDRICKSON, Russell W., Lt., USN  
 HENDERSON, William A., Capt., USN  
 HERRING, Alexander C., Comdr., USN  
 HILL, David W., Capt., USN  
 HIRSH, David J., Lt., USN  
 HOFF, David F., Lt. Comdr., USN  
 HOTTENSTEIN, David F., Capt., USN  
 HOUT, Charles S., Capt., USAF  
 HODGENS, Robert C., Lt., USN  
 HODGESS, Allen S., Capt., USAF  
 HODGESS, Joseph E., Capt., USN  
 HUTCHINSON, Glenn C., Capt., USN  
 HUTTON, George W., Comdr., USN  
 KAYE, Maxwell E., Comdr., USN  
 KEATING, James L., Lt. Comdr., USN  
 KELLER, William R., III, Capt., USAF  
 KELLEY, Joseph F., Capt., USAF  
 KELLEY, Richard E., Capt., USN

KIMBALL, Glenn J., Lt., USN  
 KIRKLAND, Theodore N., Jr., Lt. Comdr., USN  
 KIRSCHBAUM, Thomas H., Lt., USN  
 KOELLIKER, Joseph W., Jr., Capt., USAF  
 KOROSEC, Blaz, Lt. Comdr., USN  
 KRAYNICK, Benjamin M., Lt., USN  
 KULCZYCKI, John, Jr., Col., USAF  
 KWIATKOWSKI, Peter S., Capt., USN  
 LADNER, William, Capt., USAF  
 LAMOTHE, Isidore J., Jr., Capt., USAF  
 LAMPROS, George W., Lt., USN  
 LANEVE, Samuel A., Capt., USAF  
 LAUFENBURG, Herbert F., Lt., USN  
 LAWRENCE, Richard, Jr., Capt., USN  
 LEHMAN, Robert C., Comdr., USN  
 LEHRER, Harold, Lt., USN  
 LESTER, Richard L., Jr., Lt., USN  
 LINEHAN, Francis J., Jr., Lt. Comdr., USN  
 LIPPINCOTT, Charles A., Comdr., USN  
 LIVINGOOD, William C., Capt., USN  
 LORING, Marvin F., Lt. Comdr., USN  
 LOWE, Norman, Lt., USN  
 LOWEECEY, Edward D., Lt. Comdr., USN  
 LOWREY, Douglas H., Capt., USAF  
 LOWRY, Elmer F., Jr., Comdr., USN  
 LUNG, Ronald R., Lt., USN  
 MAHONEY, David I., Jr., Maj., USAF  
 MARKWOOD, Carl C., Capt., USAF  
 MARSHALL, Charles B., Maj., USAF  
 MARTINEZ, Carlos E., Lt. Comdr., USN  
 MASON, Alfred R., Comdr., USN  
 MATSUDA, Arthur T., Lt., USN  
 MCCASLIN, Frank E., Jr., Lt., USN  
 MCCULLOUGH, Francis H., Jr., Comdr., USN  
 MCCELKEINNEY, Thomas R., Capt., USAF  
 MCGARY, Lester E., Jr., Capt., USAF  
 MCKAY, Ernest G., Lt. Comdr., USN  
 MCLAUGHLIN, James A., Comdr., USN  
 McLEOD, Deane E., Lt. Comdr., USN  
 MEAD, Allen W., Lt., USN  
 MEARS, Claud M., Col., USAF  
 MENDEL, Gerald A., Capt., USAF  
 MERKLE, Vernon J., Lt. Comdr., USN  
 MESSERSMITH, John L., Capt., USN  
 MILLER, Harold L., Lt., USN  
 MILLER, Joseph A., Capt., USAF  
 MILLER, Lloyd F., Comdr., USN  
 MILLS, Dawson A., Capt., USN  
 MINARD, David, Comdr., USN  
 MOELLER, Ernst R., Capt., USN  
 MONES, Robert J., Lt., USN  
 MOORE, Donald B., Capt., USAF  
 MORAN, Charles E., Capt., USN  
 MORGAN, Francis M., Comdr., USN  
 MORRIS, Neal, Capt., USN  
 MORRIS, William E., Comdr., USN  
 MOUTON, Keith F., Lt., USN  
 MOXON, Robert K., Comdr., USN  
 MUGRAGE, Ralph M., Capt., USN  
 MULLIN, Raymond J., Jr., Capt., USAF  
 MURPHY, John M., Capt., USN  
 MYKOFF, David J., Capt., USAF  
 NAY, Howell, Capt., USN  
 NEEL, Edward R., Comdr., USN  
 NELSON, Frank F., Capt., USAF  
 NORTON, John A., Col., USAF  
 NUTCHALL, Lester C., Capt., USAF  
 OCHOA, Gonzalo G., Lt. Comdr., USN  
 OSTERMICH, Frank, Lt. Comdr., USN  
 PALMER, Harold V., Comdr., USN  
 PANNER, Bernard, Lt., USN  
 PARSON, Oliver J., Lt. Comdr., USN  
 PAST, N. J., Jr., Capt., USAF  
 PATTERSON, Roy R., Maj., USAF  
 PEARSON, Sherman M., Capt., USN

PEARSON, John K., Capt., USAF  
 PEFFLY, Elmer D., Capt., USAF  
 PENNINGTON, Robert, Jr., Capt., USN  
 PENTON, Arthur, Jr., Capt., USAF  
 PERUCCA, Leo G., Lt., USN  
 PETERJOHN, Harlan R., Lt., USN  
 PETERS, Earl R., Lt. Comdr., USN  
 PHILIE, Henry J., Jr., Capt., USAF  
 PIROTT, Richard A., Lt., USN  
 PRESTON, Frank R., Lt. Comdr., USN  
 RAFTERY, Alan, Comdr., USN  
 RANDEL, Harvey O., Lt. Comdr., USN  
 REDMON, Agile H., Jr., Lt., Comdr., USN  
 REINHARDT, Roger F., Lt. Comdr., USN  
 RESNICK, Nolan, Capt., USAF  
 RICCIUTTI, Vincent, Capt., USAF  
 ROBINSON, Donald W., Comdr., USN  
 ROSENBERG, Saul A., Lt., USN  
 ROUKEMA, Richard W., Lt., USN  
 ROWBERG, Raymond G., Lt. Comdr., USN  
 ROY, Gustave A., Capt., USN  
 RUPNIK, Edward J., Lt. Comdr., USN  
 SANTIAGO, Miguel, Capt., USAF  
 SANTIAGO, Stevenson S., Comdr., USN  
 SARVER, Richard E., Lt. Comdr., USN  
 SCHMITZ, Everett J., Comdr., USN  
 SCHULTE, John H., Lt. Comdr., USN  
 SCHULTZ, Russell T., Lt., USN  
 SCHWARTZ, Ernest, Capt., USAF  
 SEBRECHTS, Paul H., Lt. Comdr., USN  
 SERENATI, Quintin J., Col., USAF  
 SHAUL, John F., Capt., USN  
 SIEGEL, Charles I., Lt., USN  
 SILL, John T., Capt., USN  
 SILLERY, William R., Lt. Comdr., USN  
 SIMONS, Julio S., Capt., USAF  
 SKLAR, Jordan J., Lt., USN  
 SMITH, Bobby L., Capt., USAF  
 SMITH, Eugene B., Lt. Comdr., USN  
 SMITH, Lawrence W., Lt. Comdr., USN  
 SMITH, Myron R., Capt., USAF  
 SMITH, Robely D., Capt., USAF  
 SMITH, Thomas W. D., Lt. Comdr., USN  
 SNYDER, William A., Lt. Comdr., USN  
 STECKLER, Paul P., Lt., USN  
 STEINER, Leon E., Lt. Comdr., USN  
 STERNKAMP, George R., Lt. Col., USAF  
 STOCKER, George E. F., Capt., USN  
 STONER, Max A., Capt., USAF  
 STRECK, Fletcher W., Lt. Col., USAF  
 STROUD, Clyde S., Jr., Capt., USN  
 STUTSMAN, Robert E., Capt., USN  
 TARGGART, William H., Lt., USN  
 THELEN, Emil P., Comdr., USN  
 THOMAS, William L., Lt. Comdr., USN  
 TOWNSEND, Frank M., Col., USAF  
 TRIER, William C., Lt. Comdr., USN  
 TROY, John W., Lt. Comdr., USN  
 TURVILLE, William C., Comdr., USN  
 TYBURCZY, Joseph A., Capt., USN  
 URBAN, Clifford H., Lt., USN  
 VANETTEN, Chester L., Col., USAF  
 VETTER, John S., Capt., USAF  
 VORIS, Frank B., Capt., USN  
 WALDRON, John F., Lt., USN  
 WALKER, James W., Lt., USN  
 WARD, Donald O., Lt. Comdr., USN  
 WATERS, Wayne W., Capt., USN  
 WATTEN, Raymond H., Lt. Comdr., USN  
 WATTS, Charles C., Jr., Maj., USAF  
 WEBER, Elmer A., Jr., Lt. Comdr., USN  
 WEBERAUCH, Harry, Capt., USAF  
 WHITE, Henry C., Lt., USN  
 WHITE, Neil V., Lt. Comdr., USN  
 WEDLIGHT, Seymour, Lt. Col., USAF

# MEDICAL CORPS—Continued

WILLIAMS, Chas O., Jr., Capt., USAF  
WILLES, Stanley E., II, Lt. Comdr., USN  
WILMER, Harry A., Comdr., USN  
WINGARD, Christian, Lt. Comdr., USN

WOODRUFF, William E., Comdr., USN  
WOODWORTH, Fernando S., Capt., USAF  
ZITZER, Roy W., Jr., Capt., USAF  
ZWEIFLER, Andrew J., Capt., USAF

## DENTAL CORPS

ABBOTT, Paul L., Lt., USN  
ADLEY, James E., Jr., Lt., USN  
ANDREWS, Wallace S., Comdr., USN  
APPLEGATE, Donald E., Lt., USN  
ASCHEP, Stanley S., Maj., USA  
BAKER, Howard, Capt., USAF  
BAKER, Roger J., Lt., USN  
BARR, Charles E., Lt., USN  
BASS, Joe K., Lt., USN  
BAXTER, Donald H., Capt., USAF  
BEAUVAIS, Fawcett J., Jr., Comdr., USN  
BERKOWITZ, Morrey, Lt., USN  
BERLAD, Solomon J., Maj., USA  
BINGHAM, Charles V., Maj., USA  
BRENNER, James H., Lt., USN  
BROUILLETTE, Joseph N., Lt., USN  
BRYANT, Vernon O., Lt., USN  
CAHILL, James M., Lt., USN  
CHURAN, Joseph S., Maj., USA  
COLGAN, Edward J., Lt., USN  
COHANT, Adrian R., Comdr., USN  
COOPER, Richard G., Comdr., USN  
COULTER, George M., Lt., USN  
CRAWFORD, Jack G., Lt., USN  
CAMPBELL, Roy V., Lt., USN  
DANNE, Arthur J., Lt., USN  
DARNALL, William L., Jr., Comdr., USN  
DEWES, Dean A., Maj., USA  
DESCHEMES, Donald L., Lt., USN  
DEBROUINTE, Frank, Comdr., USN  
DODGE, Charles A., Comdr., USN  
DOUGHERTY, Lewis W., Jr., Lt., USN  
DUBROW, Jacob R., Capt., USAF  
DUNCAN, Elmer T., Capt., USAF  
EIDEN, Eugene F., Capt., USAF  
EINHORN, Bernard I., Lt., USN  
ELWELL, Kenneth R., Col., USAF  
EUBANK, Dillard P., Jr., Comdr., USN  
FECHER, Con J., Jr., Capt., USAF  
FERRY, John M., Lt., USN  
FIELDS, Robert E., Lt., USN  
FLEUCHAUS, Philip T., 1st Lt., USAF  
FLOOD, Jack F., Comdr., USN  
FRANCIS, Jack C., Lt., USN  
FUNKHOUSER, Donald A., Lt., USN  
GARRISON, Edgar L., Capt., USAF  
GARTON, William C., Comdr., USN  
GEER, John F., Maj., USA  
GRANGER, Ronald G., Lt., USN  
GRAY, Gus W., Comdr., USN  
GUAY, Edward T., Comdr., USN  
HALL, Cecil B., Capt., USAF  
HALLSTEAD, Richard, Lt., USN  
HALSTEAD, Charles L., Lt., USN  
HAMILTON, Martin R., Comdr., USN  
HANSON, Thomas J., Comdr., USN  
HARMON, Carlos B., Maj., USA  
HASS, Albert F., Comdr., USN  
HATCHETT, Charles M., Jr., Capt., USAF  
HEALY, John H., Maj., USA  
HECHT, Leon J., Lt., USN  
HELLERMAN, Leonard P., Lt., USN  
HEINER, Sidney H., Capt., USAF  
HINZE, Lowell A., Lt., USN  
HODGE, Douglas R., Lt., USN  
HODGSON, Gerald L., Comdr., USN  
HOLLAND, Joseph A., Lt., USN  
HONICK, Henry, Jr., Lt., USN  
HOUSE, Ernest E., Maj., USA

HURBY, John P., Lt., USN  
HUSER, William C., Lt., USN  
HUBERWALD, August R., Col., USAF  
HUGHES, Wilfred, Comdr., USN  
HUNT, William C., Maj., USA  
PYATT, Don D., Lt., USN  
JENNINGS, John K., Jr., Lt., USN  
JENNINGS, Robert M., Lt., USN  
JOHN, John T., III, Lt., USN  
JOHNSON, Joseph M., Lt., USN  
JONES, Preston M., Capt., USAF  
JUNG, Elmer F., Jr., Capt., USAF  
JUNKER, Wilbert D., Capt., USAF  
KACHNER, Robert H., Lt., USN  
KEELS, Cameron H., Jr., Lt., USN  
KESLER, James F., Comdr., USN  
KESTER, Earl L., Jr., Lt., USN  
KEITH, Donald J., Lt., USN  
KELLEY, John F., Lt., USN  
KENNEY, Gordon S., Lt., USN  
KING, William V., Jr., Lt., USN  
KNOT, William H., III, Lt., USN  
KNOPF, Thurston D., Comdr., USN  
KORING, Albin J., Comdr., USN  
KRAAS, Benjamin M., Lt. Col., USAF  
KRASKE, Leonard E., Comdr., USN  
KUFFREY, Clyde E., Lt., USN  
KUNTZ, Paul E., Lt., USN  
KUCUZIAN, Kersam K., Comdr., USN  
LACHER, Farold S., Jr., Lt., USN  
LARSON, Gilt H., II, Comdr., USN  
LECLERCQ, Edward L., Lt., USN  
LEE, William T., Maj., USA  
LEGGO, Vincent, Capt., USAF  
LEVIN, Donald L., Capt., USAF  
LITTLE, Earl E., Jr., Lt., USN  
LOOPER, Joseph W., Lt., USN  
MARKING, William M., Comdr., USN  
MARTENS, Robert L., Capt., USAF  
MAY, Russell, Jr., Capt., USAF  
MC DONALD, Edward D., Comdr., USN  
MCKEE, Reuben A., Jr., Comdr., USN  
McMANUS, Thomas A., Jr., Lt., USN  
MEERS, James E., Jr., Capt., USAF  
MELLARD, Robert J., Maj., USA  
MELLER, Da ton, Jr., Maj., USA  
MELLER, Edward F., Capt., USAF  
MITCHELL, Edward C., Comdr., USN  
MORELLI, Ernest J., Capt., USAF  
MOURADIAN, William F., Capt., USAF  
NEESLEN, Louis W., Lt., USN  
NESTING, Henry M., Lt., USN  
NICAUD, Wallace M., Jr., Lt., USN  
NICHOL, Bernard E., Lt., USN  
NIEDER, Robert M., Lt., USN  
NORRIS, Alvin E., Comdr., USN  
NORRIS, Russell S., Maj., USA  
OGILVIE, Leslie C., Lt., USN  
OSADA, Takeshi, Capt., USAF  
PARRISH, Cecil O., Comdr., USN  
PERRYMAN, James F., Comdr., USN  
PERRYMAN, George L., Jr., Lt., USN  
PETERS, James W., Lt., USN  
FINARD, Monty P., Lt., USN  
POOL, William L., Lt., USN  
PRICE, Delbert D., Maj., USA  
PROFFA, Carlo J., Capt., USAF  
RICE, William T., Comdr., USN  
RILL, Charles A., Comdr., USN

# DEITAL CORPS—Continued

ROLAND, William R., Lt., USN  
 ROSENBERG, Herbert D., Maj., USAF  
 RUDAN, Thomas W., Lt., USN  
 RUPP, Nelson W., Comdr., USN  
 SAIN, Joe A., Capt., USAF  
 SANBORN, Howard P., Lt., USN  
 SELBY, Stephen M., Lt., USN  
 SEYMOUR, Wilbera B., Lt., USN  
 SMALL, Gilbert S., Lt., USN  
 SMITH, Ian M., Capt., USAF  
 SMITH, John A., Lt., USN  
 SMITH, John H., Comdr., USN  
 SMITH, Winthrop F., Comdr., USN  
 STAKER, Donald E., Lt., USN  
 STINES, Virgil L., Maj., USA  
 TENCA, Joseph L., Lt., USN

TESHER, Frederick K., Lt., USN  
 THOMAS, William M., Lt., USN  
 TIPPIN, Joseph G., Jr., Comdr., USN  
 TURNER, Charles E., Maj., USA  
 TYLER, John C., Comdr., USN  
 VANAMAN, Nathan E., Maj., USA  
 VANDAMM, Vincent W., Comdr., USN  
 WARREN, Ross W., Maj., USA  
 WELD, Donald L., Lt., USN  
 WEST, Frank M., Jr., Lt., USN  
 WHITE, Paul C., Comdr., USN  
 WHITTEMORE, Robert Y., Jr., Maj., USA  
 WILAMCOWSKI, Edward E., Jr., Capt., USAF  
 WILLIAMS, Claude R., Lt., USN  
 WITTHOFFT, Walter F., Comdr., USN  
 WYCOFF, Samuel J., Lt., USN

## MEDICAL SERVICE CORPS

BAHR, Donald W., 1st Lt., USAF  
 BARFIELD, Aaron H., 1st Lt., USAF  
 BARFIELD, Arie C., 1st Lt., USAF  
 BAUMER, Chester J., 1st Lt., USAF  
 BOYCE, James M., 1st Lt., USAF  
 BUTLER, Henry M., Col., USAF  
 CALORE, Joseph E., 1st Lt., USAF  
 CHEEK, Russell C., Lt. Col., USAF  
 CHITWOOD, Lawrence A., 1st Lt., USAF  
 COLE, Malcolm A., 1st Lt., USAF  
 COVELL, Donald E., Capt., USAF  
 CUNNINGHAM, William J., 1st Lt., USAF  
 CURTIS, Thomas J., Maj., USAF  
 DIRONA, Joseph, Capt., USAF  
 ROMANISH, Thaddeus J., Col., USAF  
 DURKEN, John A., Jr., 1st Lt., USAF  
 ELLER, Richard W., 1st Lt., USAF  
 FREDERICKSEN, Charles F., 1st Lt., USAF  
 FRIEDLAND, John C., Jr., 1st Lt., USAF  
 FUCCHILLO, David A., 1st Lt., USAF  
 GOLEN, Jerome F., 1st Lt., USAF  
 GOENTZ, Paul R., 1st Lt., USAF

GULLEY, Wayne E., Capt., USAF  
 HANKS, Charles T., 1st Lt., USAF  
 HARTLEY, James E., 1st Lt., USAF  
 HARTMAN, Hugh A., 1st Lt., USAF  
 HILL, Albert E., Capt., USAF  
 HUNT, Clyde T., Capt., USAF  
 HUTCHINSON, Frank L., Capt., USAF  
 IPPOLITO, Joseph W., 1st Lt., USAF  
 KELLER, Paul C., Lt. Col., USAF  
 KIRNEY, Joe E., Col., USAF  
 KIRKEL, Hubert P., Capt., USAF  
 MULLIN, Paul B., Capt., USAF  
 OGREN, Richard C., 1st Lt., USAF  
 PARADA, Armand R., 1st Lt., USAF  
 PAYNE, Jack L., 1st Lt., USAF  
 PRICE, William B., Jr., Capt., USAF  
 CARRATT, Dale W., 1st Lt., USAF  
 SHAW, Emil G., Capt., USAF  
 SEGEL, Lawrence, 1st Lt., USAF  
 THANTON, Harold D., Maj., USAF  
 WELLS, Billy E., 1st Lt., USAF  
 WISNICKI, Charles S., Capt., USAF

## NURSE CORPS

## Reviews of Recent Books

A TEXTBOOK OF CLINICAL PATHOLOGY, edited by Seward E. Miller, M. D.  
5th edition. 1,208 pages; illustrated. The Williams & Wilkins Co., Baltimore, Md., 1955. Price \$11.

This comprehensive book on clinical pathology was formerly edited by Kracke and Parker. Dr. Miller became editor after publication of the third edition, and he is assisted by nine contributors. Dr. L. W. Diggs of the University of Tennessee has written the chapters on the examination of the blood as concerns hemoglobin, erythrocytes, leukocytes, reticulocytes, thrombocytes, prothrombin, and fibrinogen, and on examinations related to the anemias, erythrocytosis, hemoglobinemia, and hemorrhagic and thromboembolic diseases. Dr. I. Davidsohn of the Chicago Medical School and Mount Sinai Hospital covers the leukemias and other diseases affecting leukocytes as well as the difficult subject of the blood groups. Doctors Cohn and Kaplan of the Michael Reese Hospital in Chicago have written the chapters on blood chemistry and tests for hepatic function. Dr. Milzer of the same hospital is the author of chapters on the assay of chemotherapeutic and antibiotic agents and on the diagnosis of viral and rickettsial diseases, and a new chapter on medical bacteriology. The editor has written new chapters on parasitology and the examination of seminal fluid and feces as well as the chapters on serology, examination of cerebrospinal fluid, saliva, sputum, gastric and duodenal contents, urine, and tests of renal function.

Dr. Emmerich von Haam of Ohio State University is the author of chapters on the assay of vitamins and hormones, the examination of transudates, exudates, the skin and mucous membranes, and the diagnosis of venereal lesions. Dr. McBurney of the Medical College of Alabama has contributed a chapter on immunologic tests such as agglutination, precipitin, and complement-fixation procedures.

New contributors to this edition are Doctors Emma Moss and Albert McQuown of Louisiana State University who have written a chapter on medical mycology.

The book is designed to assist the physician in knowing what tests to request; when, in the course of a disease, to request them; and how to interpret the report. Because of this the details of laboratory procedures are in some cases omitted, but appropriate references are cited. The chapter on blood chemistry, for example, contains no procedures. In many of the sections, however, procedures are detailed, as for example the chapter on blood technics, parasitology, immunologic tests, bacteriology, and examinations of cerebrospinal fluid, transudates and exudates, gastric and duodenal contents, and urine. In general those tests which are commonly performed by the interne, resident,

or practicing physician are given in detail, while procedures usually performed by highly trained technical personnel such as those in the field of chemistry and serology are omitted.

Because the authors emphasize the bases and interpretations of laboratory diagnostic procedures this book is useful to the clinician as well as to the clinical pathologist. All sections are well written and there are numerous illustrations. Each chapter has an extensive bibliography. This fifth edition will no doubt prove as popular as previous editions. —HUGH R. GILMORE, Jr., Col., MC, USA

THE BODY FLUIDS, Basic Physiology and Practical Therapeutics, by J. Russell Elkinton, M. D. and T. S. Danowski, M. D. 626 pages; illustrated. Williams & Wilkins Co., Baltimore, Md., 1955. Price \$10.

In one volume the authors have summarized the present voluminous material in this important field. The organization of the book is excellent in that the material is presented under four main heads, namely "Basic Physiology," "Basic Principles as Common Denominators in Clinical Situations," "Disease Entities," and "Clinical Dicta and Practical Therapeutics." In addition, an appendix outlines one procedure for balance studies.

The authors frankly admit that "intelligent fluid therapy is a matter of trial and error." They have drawn on both their vast experience and that of many others in an attempt to clarify a subject confusing to many. They point out that much is yet to be learned but that this volume is intended to present what has been learned and accepted up to the present time, and they acknowledge the fact that there is some variance in interpretation of the accumulated knowledge.

The book is well illustrated with graphs, charts, and tables. It contains many formulas of solutions to be considered in treatment of the patients with both normal and abnormal regulatory mechanisms. It emphasizes the principles to be considered in selecting the proper therapeutic approach for specific disease entities.

The research worker in this field will find this book of value both because of its contents and because of the extensive references at the end of each chapter. The clinician will find value in the practical application of the principles so well defined and discussed. This work is recommended for all medical libraries and for all physicians.

—PAUL S. FANCHER, Col., MC, USA

CARDIAC DIAGNOSIS, A Physiologic Approach, by Robert F. Rushmer, M. D. 447 pages; illustrated. W. B. Saunders Co., Philadelphia, Pa., 1955.

Within relatively few pages, considering the extensive scope of the material presented, this book describes and correlates in concise, readable, and comprehensible form the current and fundamentally complete physiologic principles directly applicable to clinical cardiac diagnosis.



The book is well integrated and is organized into five parts. Part One describes the functions of the normal cardiovascular system and emphasizes that the heart is but an integral part of the entire circulatory system. Part Two concerns the regulation of the cardiovascular system and the adjustments of the heart and peripheral vessels in response to constant and varying demands. Chapters on cardiac reserve and the etiology of congestive failure are presented in another section, which reviews the concepts of mechanisms involved in congestive failure. Part Four clearly and in sufficient detail describes those methods and observations necessary for the recognition of cardiovascular abnormalities. Finally, the fifth section applies the basic physiologic principles to the diagnosis of cardiac disease.

A textbook of this type has been needed, it merits immediate approval, and there is full agreement with the author who feels it is intended for students of medicine in the broadest sense; from first year medical students to experienced physicians.\* This book should be readily available to all medical students, interns, and residents, and would be an asset to any medical library.

Illustrations are profuse, relevant, and a tremendous aid in rapid orientation. Each chapter has an extensive and current bibliography, and the book itself is well indexed.

—JOHN H. WARD, Jr., Capt (MC) USN (Ret.)

**DISORDERS OF CHARACTER, Persistent Enuresis, Juvenile Delinquency and Psychopathic Personality**, by Joseph J. Michaelis, M. D. 148 pages. Charles C Thomas, Publisher, Springfield, Ill., 1955. Price \$4.75.

This volume contains a symposium of articles written by the author over an 18-year period. The papers have been arranged in such a way as to attempt to present statistical data, a review of pertinent literature, a conception of the relationship of enuresis and the electroencephalogram to neurotic and antisocial traits of character and behavior disorders of children, and finally an evaluation of the data in terms of psychoanalytic and psychobiologic concepts. Implications for treatment and research suggested by the complete study are discussed, and a brief but adequate summary gives the collection of papers a more homogeneous perspective than initially grasped when read in sequence.

It is this reader's opinion that the author has made valuable observations concerning the multiple facets of an important social and medical problem. It seems probable that the observations might represent a more significant contribution to the field of personality development and character disorder if all of the original papers per se had not been used but rather had been reorganized to present the ultimately essential data of the papers. Many readers, I believe, will be misled by the title which seems inappropriate to the several ideas considered in the volume. The author's argument and plea for a holistic approach to the study of character, its development, and deviations is wholeheartedly concurred in by this reviewer. — JULIEN C. KENNEDY, Lt. Col. MC, USA

ESSENTIALS OF BIOLOGICAL AND MEDICAL PHYSICS, by *Ralph W. Stacy*, Ph. D., *David T. Williams*, Ph. D., *Ralph E. Worden*, M. D., and *Rex O. McMorris*, M. D. With an Introduction by *Otto Glasser*, Ph. D., F. A. C. R. 586 pages; illustrated. McGraw-Hill Book Co., Inc., New York, N. Y., 1955. Price \$8.50.

This book is the first text written specifically for students in the rapidly expanding field of biophysics. This statement alone dramatizes an appreciation of the growing requirements for teaching the essentials of biophysics to our nation's medical and biology students. The facts of modern medical developments necessitate an appreciation of these concepts by the civilian practitioner, and are essential for an understanding of the varied military problems faced daily by the military surgeon.

The book is divided into 10 parts covering fundamental concepts, mechanical systems, heat thermodynamics, bio-acoustics, light, the physics of gas and fluids, electrical systems, nuclear reactions, and a few aspects of theoretic biophysics. Each part is directed to an understanding of practical problems, and in addition to established principles, points out some of the variables and unknowns. Some of the subjects serve as a review of physiology, but the data are presented from a slightly different approach which is perhaps more concise. The author assumes the reader has a basic knowledge of mathematics including differential equations, but these are presented in such a way that a little concentration should result in familiarity with their use and application.

In addition to recommending this book as a basic text for physicians and biologists confronted with biophysical problems, I think that military medical planners will welcome the teaching of this material in our schools as the graduates will be far better prepared for the problems presented by military medicine in our increasingly complicated world.—*JAMES B. HARTGERING*, Lt. Col., MC, USA

ROOT CANAL THERAPY, by *Louis I. Grossman*, D. D. S., Dr. med. dent., F. A. C. D. 4th edition. 399 pages; 347 illustrations on 140 figures, 1 in color. Lea & Febiger, Philadelphia, Pa., 1955. Price \$7.50.

This textbook is a comprehensive guide for treatment and diagnosis in the field of endodontia. Dr. Grossman has furnished the undergraduate student and practicing dentist with a good and simple reference for the treatment of vital and pulpless teeth.

The author thoroughly discusses the early and modern trends in this controversial area of general dentistry. His discussion of focal infection gives the dental profession an honest appraisal of a much discussed and poorly understood subject.

The text is adequately illustrated, with black and white photographs, drawings, radiographs and sketches, and written in a manner that is self-explanatory to the dentist using it as a reference. All the modern

information on the subject of root canal therapy is comprehensively covered. The section devoted to antibiotics is comprehensive and practical, and the technic of root resection and surgical approach of endodontia is graphically presented.

The chapter on instrumental and technical procedures is invaluable to the dentist. As a result of root canal treatment, many teeth become discolored. Dr. Grossman's bleaching of discolored teeth furnishes a good esthetic result.

The author should be complimented on this excellent reference book which should be a part of the library of all progressive dentists.

—WILLIAM W. SENN, Lt. Col., USAF (DC)

PSYCHOLOGY OF INDUSTRIAL BEHAVIOR, by Henry Clay Smith. 477 pages. McGraw-Hill Book Co., Inc., New York, N. Y., 1955. Price \$6.

The author, Associate Professor of Psychology at Michigan State University, has written a stimulating new book concerning a subject (psychology) that deals with material as ancient as the human race and discussing its application to modern industry. This relationship is a fairly recent development and one well worth the attention of industrial management, from group supervisors to top level executives. I believe the book has the most to offer to the industrial relation department, especially the personnel branch, of a company; but seriously doubt if many physicians who limit their practice to occupational medicine will find the time to thoroughly peruse this work. Indeed, the author professes that it is a text-book for psychology students, but hopes that it will be profitable for industrialists as supplemental reading, and helpful in planning training programs.

Professor Smith has propounded the not entirely new idea that the psychologist is to an industry what a physician is to a patient. He stresses the fact that psychology as applied to industrial behavior, in its aim to improve human relationships, lacks certain validity of method, and attributes this defect to the lack of research and of statistically significant proof that a certain action applied to a given situation will result in the desired change.

Almost two thirds of the book is given over to discussion of the results of psychologic investigation, and one third is devoted to the various psychologic methods and technics used to obtain these results. The author lays considerable emphasis on the fact that technical and mechanical difficulties are readily analyzed and solved by scientific engineering, but that human problems, which are considerably more complex, have not been scientifically studied sufficiently to allow similar solution. He contends that human problems, if approached scientifically by psychologic procedures, can and will be as readily solved as those pertaining to purely mechanical or material objects.

This reader was annoyed by the insertion of tables, diagrams, or graphs in the middle of a paragraph, a practice that tended to interrupt

the thought being developed in the text. This book has a very extensive bibliography and is well indexed.—CLARK P. JEPPEERS, *Comdr., MC, USN*

**PATHOLOGY SEMINARS**, by *Lauren V. Ackerman, M. D., Arthur C. Allen, M. D., J. E. Ash, M. D., Arthur Purdy Stout, M. D., and Rupert A. Willis, M. D.* Edited by *Robert S. Haukohl, M. S., M. D., and W. A. D. Anderson, M. A., M. D.* 195 pages; illustrated. The C. V. Mosby Co., St. Louis, Mo., 1955. Price \$10.

The importance of the clinical pathologic conference in medical teaching is well established, and the increasing number of medical journals which include at least one such conference in each regular issue indicates growing interest in the publication of this type of educational activity. "Slide Seminars," which develop as a postgraduate course of study among pathologists, are closely related and have become more and more popular. Such seminars are far more than mental gymnastics or opportunities for exhibiting diagnostic acumen on the part of the chief discussant, for they allow wide participation by those who attend, both by study of the material presented before the meetings take place and also in the selection of the material to be presented. The editors of this book have done a great service to medicine in initiating the publication of "Slide Seminars," and it is earnestly hoped that this work will stimulate further similar publications. Publication of well-organized "Slide Seminars" makes wider participation possible, and even though this is passive, it is of value.

Lesions usually studied at such conferences are not those which are routine in the experience of most pathologists. Rather, they present problems in diagnosis because of the infrequency of their occurrence or because they do not conform strictly to definitive lesions. Such lesions are not dealt with, at least not in much detail, in textbooks. The views of several experts, together with a rationale for the expressed views, can be very informative and lead to better general understanding of pathologic processes that are difficult to interpret.

It is fortunate indeed that such recognized authorities as Drs. Lauren V. Ackerman, Arthur C. Allen, J. E. Ash, Arthur Purdy Stout, and Rupert A. Willis were chosen to conduct the seminars for this publication.

While it is true, as the editors state, that the reader cannot obtain the same stimulation and pleasure enjoyed by the participants in the seminars at the time of their presentation, much of the essential value is preserved in the written record. A part of this stimulation and pleasure is due to the informality of the discussions. As a result, the individuality of the discussants is better revealed than is possible in completely organized discussions. However, it is recognized that individuals differ in their ability to achieve smoothness and perfect literary composition in informal discussions, and while this may not be

too apparent in the spoken word, it is evident in the written. It is felt that editing the discussions for publication, so that none may suffer by comparison, will not seriously impair the preservation of individuality.

Excellent photomicrographs have been used throughout this book; the printing is clear and binding is substantial; there is an adequate index. Pertinent references are placed at the end of each discussion. This book is highly recommended as a reference for pathologists in the disposition of perplexing problems of diagnosis and for clinicians who wish to add to their general knowledge and understanding of pathologic processes.—WILMOT F. PIERCE, *Capt., MC, USN*

**THE YEAR BOOK OF OBSTETRICS AND GYNECOLOGY** (1955-1956 Year Book Series). Edited by *J. P. Greenhill, M. D., F. A. C. S.* 544 pages; illustrated. The Year Book Publishers, Inc., Chicago, Ill., 1955. Price \$6.

In writing a review of this book I find that my enthusiasm must be tempered to prevent my writing advertising copy. Continuing the high quality of previous years, it is a condensed digest and analysis of the world literature on obstetrics and gynecology that is deemed most important and of most consequence and usefulness to the general practitioner, specialist, research man, and medical student.

The numerous discussions of the editor have an informal teaching charm that makes for easy reading. Many of the discussions refer to articles of previous years and correlate trends.

The section on the newborn is informative and clinically useful. It especially stresses perinatal morbidity and mortality, and emphasizes preventable causes and the need for larger research grants for study of the newborn. Articles on the current management of erythroblastosis are fully presented.

The gynecologic section presents a wide variety of useful subjects, from adolescent gynecology to geriatric gynecology. There is an excellent illustrated section on operative techniques.

Accompanying the book is a printed slip containing 23 questions on current literature. It is recommended that in future series these be enlarged on and included at the back of the book. The "quiz" trend today is enjoyed as a challenge to one's knowledge and ego.

—SAUL L. AYNER, *Lt. Col., MC, USA*

**OBSTETRICAL ANESTHESIA, Its Principles and Practice**, by *Bert B. Hershen-son, M. D.* With a Foreword by *Frederick C. Irving, M. D.* 403 pages; illustrated. Charles C. Thomas, Publisher, Springfield, Ill., 1955. Price \$9.50.

The author's approach to obstetric anesthesia is predominantly clinical. A brief historical background is given as an introduction to the many problems yet unsolved. The numerous factors of pain, fear, fever, metabolism, and sthenicity that affect the reflex irritability of the patient are correlated. The older theories concerned with the transmission

and perception of labor pain are enumerated and discussed in relation to modern theoretic and factual concepts.

The premedicating drugs employed during labor are considered to be part of the anesthetic plan and procedure. The uses and abuses of the various drugs are discussed individually and the author's favorite barbiturate-apomorphine-scopolamine premedication for uncomplicated vaginal delivery is outlined.

The classical signs and symptoms of general anesthesia and accompanying reflexes are discussed with emphasis on the importance of changing signs rather than isolated observations. Stages of anesthesia required for various obstetric procedures are tabulated. Respiratory and circulatory derangements incident to obstetric anesthesia are considered in relation to cause, prevention, and treatment. The existence of multiple factors leading to asphyxia neonatorum is emphasized, and the importance of alert teamwork in minimizing its hazards is considered mandatory.

The inhalation anesthetic agents are reviewed individually, and their uses and limitations are cited. It is the author's experience and conviction that the most controllable method of anesthesia, which will give the greatest measure of maternal protection in most circumstances, is inhalation anesthesia. The only italicized sentence in the book states that "all other inhalational agents must demonstrate some specific merit over ether when selected to produce anesthesia for a given obstetrical patient." The various regional anesthetic procedures and drugs are described and their uses outlined. There is an extensive review on the management of the obstetric patient with such complications as myasthenia gravis, heart disease, poliomyelitis, diabetes, and aspiration pneumonitis.

This book is clearly and forcefully written by a clinician for clinical instruction. The author will readily find converts who will join him in the belief that the administration of an anesthetic is a major therapeutic procedure which should be selected to fit the patient, and that the choice of anesthetic agent and technic must rest on the skill, experience, judgment, and mutual confidence of the obstetrician and the anesthesiologist working as a team. — ROBERT E. LAU, Lt. Col., USAF (MC)

THE SPINE, A Radiological Text and Atlas, by Bernard S. Epstein, M. D. 539 pages; 721 illustrations on 331 figures. Lea & Febiger, Philadelphia, Pa., 1955. Price \$16.50.

This detailed study of the spine was primarily written as a radiologic text and atlas; however, its coverage of all of the known diseases of the spine is so complete that it would be of great value to specialists other than radiologists, especially orthopedic surgeons and neurosurgeons.

Perhaps the most outstanding aspect of this text is its wide coverage of all variations in the appearance of the spine, including the

normal appearance, congenital malformations, and changes related to disease. The bibliography is complete and all controversial subjects are adequately discussed. The embryologic discussion at the beginning of the book is considered to be most complete and is slanted to be of practical importance especially in relationship to congenital malformations and inflammatory disease. The illustrations are excellent and the particular point of interest in many cases is marked by an arrow.

The spine is studied as a separate body system. The bony shell and its contents are evaluated either individually or together, depending on whether the disease is one of generalized nature or is localized to the spinal system or to one of its component parts. This work admirably fulfills the goals set forth by the author and is highly recommended to all physicians. —JAMES M. KEEGAN, *WMA, USAF (MC)*

**THE POSTURAL COMPLEX**, Observations as to Cause, Diagnosis, and Treatment, by Laurence Jones, M. D. 156 pages; illustrated. Charles C Thomas, Publisher, Springfield, Ill., 1955. Price \$9.75.

In his summary, the author of this book states that "certain portions may be so divergent as to severely strain credulity." Elsewhere he states that his "concepts as to cause, diagnosis, and treatment of symptoms arising from postural imbalance differ materially from present-day majority opinion." The personal reaction of this reviewer is that both of these statements are fully justified by the thesis as presented.

The author states that "internal rotation" of the calcaneus causes a "descent" of the sustentaculum tali, which, in turn, produces an "angular compression" of the neurovascular bundles lying in contact with the underside of the sustentacular shelf. At the same time, this internal rotation of the foot produces "serial distortions"; namely, in turn, "inward roll of the leg from top to bottom, pelvic rotation on the hip joint, increased lumbosacral angle, and variable nerve tensions." These aberrations he terms "the primary trigger mechanism." The distortions "progress from below upward and combine to produce elongating tensions which may be transmitted in varying degrees and locations to the entire central nervous system. After a varied time lapse, long-continued dysfunction due to angulation, torsion, and inequality of weight bearing may produce inflammation (noninfectious) of: (1) nerves (neuritis), (2) arteries and veins (arteritis and phlebitis), (3) muscles (myositis), (4) fascia (fibrositis), (5) ligaments (periarthritides), (6) joints (arthritis)." Thus, the author bases multitudinous affections of the musculoskeletal system on "internal rotation" of the feet.

Conversely, the answer provided by the author for these affections thus produced is a reversal of the serial distortions. This he provides by "postural shoe correction," first selecting a suitable shoe, reinforcing it with a rigid plastic fiberglass inset, adding outside corrections to the sole and heel, and then adding inside individual corrections. Complete details of this meticulous preparation of the shoes

are given, which would appear to require extensive training of skilled workmen equipped with special apparatus and materials not found in the usual cobbler's shop or brace shop.

The author has gone into the greatest detail to develop, explain, and justify his rather unorthodox theories and procedures. The text is profusely illustrated with excellent drawings, reproductions, and photographs. This reviewer found it readable and understandable although difficult to accept, but, in fairness, must admit to no personal experience with the procedures and to the possibility that they may be as effective as the author claims. It is considered to be a text suitable only for an experienced orthopedic surgeon with a background of extensive clinical practice, judgment, and ability to evaluate.

—JOHN D. BLAIR, Col., MC, USA

FORENSIC MEDICINE, A Textbook for Students and Practitioners, by Sir Sydney Smith, C. B. E., LL. D., and Frederick Smith Fiddes, O. B. E., M. D. 10th edition. 644 pages; 173 illustrations. Little, Brown & Co., Boston, Mass., 1955. Price \$10.

The 10th edition of this standard British text brings it up to date so that it may continue in use as a teaching tool and ready reference in the field of forensic medicine. As the author points out, every physician is faced with problems of a forensic nature in his practice, and some specific knowledge in addition to general medical information and common sense is required in elucidating such problems before legal authorities. Although specific laws may vary with locale, the basic principles of medical evidence as outlined in this book are universally applicable. It is designed for the clinical practitioner rather than for the specialist, and the readability and simplicity of the text, augmented by usable charts and clear illustrations, make it an excellent source for prompt and reliable reference. In addition the statistical tables, appendixes, specific descriptions of various conditions, and clinical toxicology will prove of great value as reference material for those specializing in forensic medicine. The text is recommended for inclusion in medical libraries, for the reference shelf of physicians commonly faced with medicolegal problems, and as additional reading for students during courses in forensic medicine.—ALAN RAFTERY, Comdr., MC, USN

ADMINISTRATIVE MEDICINE, Transactions of the Third Conference, October 6, 7, and 8, 1954, Princeton, N. J. Edited by George S. Stevenson, M. D. 172 pages. Sponsored by the Josiah Macy, Jr. Foundation, New York, N. Y. Published by Josiah Macy, Jr. Foundation Publications, Packanack Lake, N. J., 1955. Price \$3.

The participants of this conference represent a cross-section of some of the most outstanding authorities in the United States directly or indirectly related to the field of administrative medicine. The proceedings of this conference are published in order to share the experiences of these meetings with a larger audience. Although verbatim reporting has not been done, every effort has been made to preserve the spirit of the conference.



Here an excellent interchange of ideas has been brought about by the conferees in defining the special characteristics of medical administration. A wide variety of opinions are expressed in setting administrative medicine apart from the other fields of administration. Interestingly these differences have been shaded somewhat by the background and current field of endeavor of the individual participant—the medical administrator, the nonmedical administrator, the personnel director, and the sociologist.

Although a number of different interpretations are brought out, a general pattern of expression emerges relative to the problems of medical administration as distinct from other fields of administration. Most significant is the fact that in the former the objects which are administered are persons and in the latter they are things. Even more distinct is the fact that they are sick persons. Here an intangible personal service is rendered that cannot be weighed or packaged and that is difficult to evaluate.

The hospital has grown up over the years on a nonprofit basis and with a humanitarian approach as contrasted to the commercial organization which exists for only one reason—profit. And finally the task of the medical administrator, particularly the hospital administrator, is far more difficult than that of the business administrator in view of the multiple types of specialized personnel with whom he must deal, many of whom are rugged individualists. Keeping this team on a harmonious yet productive basis requires the many attributes and talents of a social engineer.

Other topics included a discussion of the distinctive characteristics and educational requirements of this unique field—medical administration, the principles and concepts of business administration as applied thereto, and the complexities involved in the adaption of the hospital to the environment of the community which it serves.

One of the most valuable contributions of this book is the chapter on the hospital and its relationship to the community, in which Dr. Ray E. Trussell relates his experiences in the establishment of a county medical center. This center exemplifies in its truest sense a community program of total medical care embracing all facets of preventive medicine and curative medicine. Most significant is the fact that this center has the solid backing of the entire community for which it most ably provides a well-balanced program of medical care of the highest caliber. The establishment of a central core of full-time medical specialists who maintain affiliation on the faculty of several university medical schools at considerable distance; the establishment of a rotational medical student, internship, and residency program with these schools; and the integration of the local general practitioners on the visiting staff of the center under the supervision of the permanent members of the staff are features of this program which place it in a category all of its own.—BYRON L. STEGER, Col., MC, USA

**STUDIES IN THE FUNCTIONS AND DESIGN OF HOSPITALS.** The Report of an Investigation sponsored by the Nuffield Provincial Hospitals Trust and the University of Bristol. 192 pages; illustrated. Geoffrey Cumberlege, Publisher to the University, Oxford University Press, Amen House, London E. C. 4. Distributed by Oxford University Press, Inc., New York, N. Y., 1955. Price \$15.

This volume presents a five-year study of the functions and design of hospitals by a selected group of researchers in the field of hospital economics and planning. The investigators approached this problem from the following points of view: (1) Studies of individual departments, (2) studies of the physical environments, such as heating, lighting, ventilation, color, control of noise, fire prevention, et cetera; and (3) studies of hospital patient loads, *i. e.*, the demand for hospital services arising from the needs of the surrounding area. Although aware of the accumulated knowledge and experience of those in daily contact with hospital problems, their studies were aimed at the collection of data rather than of opinion. Opinions in these fields are abundant, but little factual data is available. The investigators hope that by forging as their principal aim the provision of data collection, it will enlighten hospital authorities, staffs, and architects confronted by many complex problems, and may stimulate and encourage the creation of new designs and improved methods of operation for solution of these intricate problems.

This study has excellent diagrams depicting the pattern of movement of personnel in the hospitals, architectural drawings of experimental wards, functional charts of the effectiveness of good planning to facilitate the operation of an outpatient service, modern layouts of operating suites, and extensive investigative data on physical environment within the hospital.

This book is an excellent source of hospital function studies and a valuable addition to the reference library for hospital construction, design and function. It is strongly recommended to the students of hospital administration and for all hospital libraries.

—JOSEPH R. VIVAS, Col., MC, USA

**MOSQUITOES, Their Bionomics and Relation to Disease,** by William R. Horsfall. 723 pages. The Ronald Press Co., New York, N. Y., 1955. Price \$16.

This book is a very comprehensive treatise on the bionomics of mosquitoes and their relation to disease transmission. It covers an important area of the broad field of culicidology which has long been in need of consolidation into a single authoritative reference. The author has made an exhaustive study of the literature and has also drawn upon his own experience.

This text is applicable to the entire known fauna of the subfamily Culicinae. It will be most useful to epidemiologists, sanitarians, entomologists, ecologists, and collectors. It is particularly useful as a starting point for new investigations and will relieve the researcher of

much time-consuming work in gathering background data which is already well known. The extensive index of genera and species should also prove to be a most valuable reference. This monograph is, without a doubt, the only authoritative and comprehensive reference to date on the bionomics of the Culicinae of the world.

—WALTER J. LA CASSE, Lt. Col., USAF (MSC)

CANCER CELLS, by E. V. Cowdry. 677 pages; illustrated. W. B. Saunders Co., Philadelphia, Pa., 1955.

This book, written by a well-known authority, is a masterful attempt to summarize our present knowledge of cancer, its causes, treatment, and diagnosis. It is an up-to-date compilation of the many and varied facets of this dread disease.

Because in a few hundred words one cannot adequately summarize and review a textbook of 677 pages which, in itself, is a summation and a digest of the many investigations in oncology, it seems best to present the book's organization. The first chapter gives a brief discussion of benign and malignant tumors. The next five chapters are devoted to the discussion of the properties of malignant cells, and include a comparison between the normal and malignant cells. In the succeeding 10 chapters, the author discusses carcinogens, susceptibility of normal cells to carcinogens, duration of latency in cancer development, factors modifying the production of cancer, and the geographic frequency of different types of cancer. The final four chapters very briefly discuss diagnosis, prevention, and treatment of cancer and cancer research. At the conclusion of each chapter the author summarizes his discussions. This should be of great help to the reader who wishes a concise interpretation of the contents.

The book is well organized with a helpful table of contents, subject index, and an extremely valuable bibliography. There are relatively few misspelled words and typographical errors, which do not detract from the value of this timely book.

The printing and most of the illustrations are of excellent quality; most of the tables can be readily understood. The author has a style of writing which stimulated and provoked this reviewer's interest to explore further this seemingly insoluble mystery of the cancer problem. This book should be of great value to the clinician as well as to the cancer research worker, and should be a worthy addition to the medical library. —CHARLES J. FARINACCI, Col., MC, USA

SALIVARY GLAND TUMORS, by Donald E. Ross, M. D., F. A. C. S., F. I. C. S., F. R. C. S. (Eng.), F. R. C. S. (Edin.). 86 pages, illustrated. Charles C Thomas, Publisher, Springfield, Ill., 1955. Price \$7.50.

This monograph was written by a surgeon and will be of interest primarily to surgeons. The stated objective of the author is "to emphasize the anatomy of this area and pathological behavior of the tumors." His surgical technique for removal of parotid tumors is described

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in association with drawings progressively demonstrating the procedure. Final chapters are devoted to consideration of procedures helpful in cases of facial nerve paralysis and to the role of radiation in the treatment of salivary gland tumors.

Unfortunately some of the organization of the subject matter seems to get lost in the conversational narration which characterizes this treatise, but this criticism is offset to a considerable degree by the reader appeal such a style possesses. It is also believed that the illustration of salivary tumor lesions by colored rather than black and white photomicrographs would have increased the value of this volume. The anatomic illustrations are ample and excellent.

Clinical experience of the author with his subject is emphasized by the fact that at the time of publication he had personally cared for 138 cases of, and performed 156 operations for, salivary gland tumors. His own material is reviewed in detail after general discussion of salivary tumor pathology and appears to support his conclusions, which, gleaned from the narration, are: (1) A greater number of complete parotidectomies should be performed for benign tumors; (2) block neck dissection should be performed in every proven case of salivary cancer; and (3) sacrifice of the facial nerve is rarely necessary and should be limited to instances when it is infiltrated by malignancy.

This little book is of distinct value to every practicing surgeon who performs operative procedures on the salivary glands. It combines, under one cover, much of the information required for preoperative review and includes a valuable bibliography of 393 papers related to this subject. —JAMES P. JERNIGAN, Lt. Col., USAF (MC)

**ANALYTICAL CYTOLOGY**, Methods for Studying Cellular Form and Function, edited by Robert C. Mellors, M. D., Ph. D.; foreword by Francis O. Schmitt, Ph. D. 522 pages; illustrated. The Blakiston Division, McGraw-Hill Book Co., Inc., New York, N. Y., 1955. Price \$15.

This book brings together, under one cover, physical and chemical knowledge, with emphasis on physical methods, that can be applied to the analysis of cellular structure and function. Nine chapters by American and European workers present: (a) methods in the optical spectrum with cytophotometry, chemical staining, and microscopy concerned with phase-contrast, interference-contrast, polarization, fluorescence, and ultraviolet microabsorption procedures; and (b) methods in the higher energy spectrum of electrons, x-rays, and gamma and alpha particles concerned with electron microscopy, radioautography, historadiobiology, and x-ray diffraction.

Most of the material was written in 1952 or before, but the long lists of excellently chosen references have "additional references" for 1954 and even for 1955 (in press).

Because cellular study now goes far beyond mere form, methods for studying such things as macromolecular structures and sites of energy

turnover and biosynthesis are important. For instance, fibrous proteins and lipid proteins, formerly postulated by physiologists, can now be differentiated by their morphology as seen in the electron microscope; and highly sensitive visual optical techniques allow analysis of living cells. Often the procedures are so lucidly and sufficiently described that the reader can go directly into the laboratory and successfully apply them. This book will be a necessary as well as a stimulating reference work in every progressive laboratory in which tissues are scientifically studied. —*ELBERT DeCOURSEY, Brig. Gen., MC, USA*

**NEUROCHEMISTRY, The Chemical Dynamics of Brain and Nerve**, edited by K. A. C. Elliott, Irvine H. Page, and J. H. Quastel. 900 pages; illustrated. Charles C Thomas, Publisher, Springfield, Ill., 1955. Price \$19.50.

This volume endeavors to present current knowledge and trends in the rapidly expanding field of chemistry of the nervous system. The book comprises 32 individual articles written by men who are recognized authorities in their special fields. Areas covered include chemical constituents of brain and nerve; various metabolic processes of the nervous system in normal and abnormal states; the biochemical aspects of convulsive phenomena, narcosis, demyelination, and neuromuscular disorders; the neurochemical effects of drugs, bacterial toxins, and snake venom; and the physiologic significance of acetylcholine, adrenaline and noradrenaline, steroid hormones, electrolytes, and other blood elements with special emphasis on correlating biochemical events with behavioral disorders.

For the clinician, such as the reviewer, who is far removed in years from the laboratory, this publication is only of limited value due to a relative unfamiliarity with a special language, chemical formulas, and modern concepts of biochemistry. Moreover, it should be recognized that the volume is not a systematic and organized treatment of neurochemistry but a series of articles on highly specialized phases of chemistry of the nervous system. There is no attempt to fit the pieces together into a framework that could be meaningful for the clinical psychiatrist. Articles concerning the chemistry of several neurologic syndromes such as convulsive seizures, neuromuscular disorders, paralysis due to toxins, and the like are more pertinent particularly for the practicing neurologist. Undoubtedly, the book will be of greatest interest to the investigators in brain and nerve chemistry and related fields, for in one compact volume there is gathered most of the known data in this sphere with bibliographic entries as recent as 1954. It is apparent that neurochemistry, like other phases of cellular chemistry, is greatly handicapped by the lack of suitable methods for studying the biochemical processes occurring within the living cell. An evaluation of the present basic techniques used in neurochemical research, and the possible future application of recent microanalytic techniques might have been valuable additions to this book. —*ALBERT J. GLASS, Col., MC, USA*

CIBA FOUNDATION COLLOQUIA ON AGEING, Volume I, General Aspects, by editors for the Ciba Foundation, G. E. W. Wolstenholme, O. B. E., M. A., M. B., B. Ch., and Margaret P. Cameron, M. A., A. B. L. S. 268 pages; 38 illustrations. Little, Brown & Co., Boston, Mass., 1955. Price \$6.75.

The contents of this volume are diverse. The contributors are from medical centers in all parts of the world and thus bring together many and varied opinions of international authorities in this increasingly important field.

The topics discussed include: Definition and measurement of senescence, pathologic basis of ageing, mental aspects, effects of ageing on respiratory function, changes with age in diffusion coefficients of solutes in human tissue membranes, vascular lesions of the skin, ageing of elastic tissue, calcium metabolism, 17-ketosteroid excretion, tissue transplantation technic applied to the problem of the ageing of the organs of reproduction, preservation of tissue, research areas in geratology nutrition, too rapid maturation in children, psychologic aspects, and adrenocortical reactivity in aged schizophrenic patients.

Especially interesting are the discussions presented at the end of each article by various other people present. Some of the work presented is beyond the scope of the average practicing physician, internist, or geriatrician as far as assisting them in treating the aged, but the papers are understandable to all physicians. The book should be interesting, not only to those in the field of geriatrics, but to all physicians. This is especially true now that our population of aged is increasing steadily and the problems of ageing are reaching greater proportions.

—DAVID L. DEUTSCH, Lt. Col., MC, USA

THE COMPLETE MEDICAL GUIDE, by Benjamin F. Miller, M. D. 913 pages; illustrated. Simon & Schuster, Inc., New York, N. Y., 1956. Price \$4.95.

This book is interesting, easy to read, well worth its price, and can be recommended to any family.

It was written for the use and guidance of the entire family. The author discusses and gives advice as to the general care of the body at home, at work, and at play. Psychiatric conditions are explained in simple terms. The basic emotions and needs in infancy, childhood, adolescence, adulthood, marriage and parenthood, et cetera, are discussed at length.

Other than emergency first aid, treatment is discussed in very general terms. Instruction on home nursing, however, is well covered. Information is included concerning periodic medical check-ups as a preventive measure, how to recognize illness early, when and how to see and select one's own doctor.

The line drawings throughout the book clearly illustrate what is intended. A large glossary and index permit easy use of the book by nonmedical persons.—PATRICK I. McSHANE, Col., MC, USA

## New Books Received

Books received by the *U. S. Armed Forces Medical Journal* are acknowledged in this department. Those of greatest interest will be selected for review in a later issue.

- A MANUAL OF FRACTURES AND DISLOCATIONS**, by *Barbara Bartlett Stimson*, M. D., Med. Sc. D., F. A. C. S. 3d edition. 224 pages; 97 illustrations. Lea & Febiger, Philadelphia, Pa., 1956. Price \$4.50.
- GUIDANCE IN GROUPS**, A Resource Book for Teachers, Counselors, and Administrators, by *Margaret E. Bennett*, Psychologist. Supplemented by A Human-Relations Program, by *Celia F. Johnson*. 411 pages. McGraw-Hill Book Co., Inc., New York, N. Y., 1955. Price \$5.50.
- AN ATLAS OF OTOLARYNGIC PATHOLOGY**, by *Colonel J. E. Asb*, R. A. (Ret'd), M. D., Former Scientific Director, American Registry of Pathology, and *Muriel Raum*, M. D., Former Registrar, Registry of Otolaryngic Pathology. Published under the joint sponsorship of The American Academy of Ophthalmology and Otolaryngology, The American Registry of Pathology, and The Armed Forces Institute of Pathology. 572 pages; 2,024 figures on 420 plates (2 color). American Registry of Pathology of the Armed Forces Institute of Pathology, Washington, D. C., 1956. Price \$20.
- DISEASES OF THE LIVER AND BILIARY SYSTEM**, by *Sheila Sherlock*, M. D. (Edin.), F. R. C. P. (Lond.). 720 pages; illustrated. Charles C Thomas, Publisher, Springfield, Ill., 1955. Price \$10.
- PSYCHOPATHOLOGY OF CHILDHOOD**, edited by *Paul Hoch*, M. D., and *Joseph Zubin*, Ph. O. The Proceedings of the Forty-Fourth Annual Meeting of the American Psychopathological Association, Held in New York City, June 1954. 303 pages. Grune & Stratton, Inc., New York, N. Y., 1955. Price \$6.
- DISEASES OF THE ENDOCRINE GLANDS**, by *Louis J. Soffer*, M. D., F. A. C. P., with *J. Lester Gabrilove*, M. D., F. A. C. P., and the Section on Glands by *Arthur R. Sobush*, M. D., F. A. C. P. 2d edition. 1,032 pages; 102 illustrations and 3 plates in color; 28 tables. Lea & Febiger, Philadelphia, Pa., 1956. Price \$16.50.
- PREPARING FOR MOTHERHOOD**, A Manual for Expectant Parents, by *Samuel R. Meaker*, M. D. 196 pages; illustrated. The Year Book Publishers, Inc., Chicago, Ill., 1956. Price \$2.
- THE COMPLETE MEDICAL GUIDE**, by *Benjamin F. Miller*, M. D. 913 pages; illustrated. Simon & Schuster, Inc., New York, N. Y., 1956. Price \$4.95.
- ROENTGEN INTERPRETATION OF FRACTURES AND DISLOCATIONS**, by *Joseph Levitsin*, M. D., and *Ben Colloff*, M. D. 265 pages; illustrated. Charles C Thomas, Publisher, Springfield, Ill., 1956. Price \$8.50.
- SHOCK AND CIRCULATORY HOMEOSTASIS**, Transactions of the Fourth Conference, December 6, 7, and 8, 1954, Princeton, N. J. Edited by *Harold D. Green*, M. D. 291 pages; illustrated. Sponsored by the Josiah Macy, Jr. Foundation, New York, N. Y., 1955. Price \$5.

- HANDBOOK OF TOXICOLOGY, Volume I, Acute Toxicities of Solids, Liquids, and Gases to Laboratory Animals. Edited by *William S. Spector*. Prepared under the Direction of the Committee on the Handbook of Biological Data, Division of Biology and Agriculture, The National Academy of Sciences, The National Research Council. 408 pages. W. B. Saunders Co., Philadelphia, Pa., 1956. Price \$7.
- A COURSE IN PRACTICAL THERAPEUTICS, by *Martin Emil Rehfuss*, M. D., F. A. C. P., LL. D. (Hon.), *Alison Howe Price*, M. D., and 24 contributors. 3d edition. 972 pages; illustrated. The Williams & Wilkins Co., Baltimore, Md., 1956. Price \$15.
- DIAGNOSIS AND TREATMENT OF VASCULAR DISORDERS (ANGIOLOGY), edited by *Saul S. Samuels*, A. M., M. D., F. A. C. A., F. A. C. C., with 17 contributors. 621 pages; illustrated. The Williams & Wilkins Co., Baltimore, Md., 1956. Price \$16.
- PRINCIPLES OF RENAL PHYSIOLOGY, by *Homer W. Smith*, Sc. D., M. D. (Hon.). 237 pages; illustrated. Oxford University Press, New York, N. Y., 1956. Price \$5.
- REGENERATION IN THE CENTRAL NERVOUS SYSTEM, by 33 Contributors. Edited by *William F. Windle*, Ph. D., Sc. D. Foreword by *Pearce Bailey*, Ph. D., M. D. 311 pages; illustrated. Charles C Thomas, Publisher, Springfield, Ill., 1956. Price \$9.50.
- CLINICAL MANAGEMENT OF RENAL FAILURE, by *Maurice B. Strauss*, M. D., and *Lawrence G. Raisz*, M. D. American Lecture Series, Publication No. 284, A Monograph in American Lectures in Urology, edited by *Reed M. Nesbit*, M. D. 114 pages. Charles C Thomas, Publisher, Springfield, Ill., 1956. Price \$2.75.
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- THE DOCTORS MAYO, by *Helen Clapesattle*. A pocket book edition. 484 pages. Pocker Books, Inc., New York, N. Y., 1956. Price \$0.50.
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- CLINICAL ELECTROCARDIOGRAPHY, Part I, The Arrhythmias, With an Atlas of Electrocardiograms, by *Louis N. Katz*, M. A., M. D., F. A. C. P., and *Alfred Pick*, M. D. 737 pages; 415 illustrations. Lea & Febiger, Philadelphia, Pa., 1956. Price \$17.50.



## Monthly Message

This office has recently received the first two copies of a new medical publication that has appeared within the past year, *The Medical Journal of the Egyptian Armed Forces*, and we welcome it wholeheartedly.

In the first two numbers there are articles by Colonel Mohamed A. Shohdy dealing with ancient Egyptian surgery. He speaks particularly of the Ebers Papyrus, which concerns mainly medical cases, and the Edwin Smith Papyrus, which has to do largely with surgery and particularly military surgery. There is evidence that specialization existed to a moderate degree, and that in dentistry the dentists treated pain and made bridges of gold. Most of you are well aware that skull trephining was practiced both in Egypt and even earlier in Babylon, the Egyptian surgeons making round holes and the Babylonians square ones.

From tablets that have been discovered it seems almost certain that tracheotomy was practiced by the Egyptians as early as 3600 B. C. In some cases of respiratory disease the patient was instructed to inhale vapors of heated aromatic solutions, and for minor surgery a form of local topical anesthesia was used. Circumcision was practiced by the priests with a scalpel or lance, and various tablets have been found depicting these operations and the instruments used to perform them.

*Frank B. Berry*

FRANK B. BERRY, M. D.

Assistant Secretary of Defense  
(Health and Medical)

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## Foreword

The *United States Armed Forces Medical Journal* is the medium for disseminating information of administrative and professional interest to all medical personnel of the Department of Defense. The Assistant Secretary of Defense (Health and Medical) and the Surgeons General of the several services invite all medical officers, dental officers, Medical Service Corps officers, Nurse Corps officers, and officers of the Veterinary Corps of the Armed Forces, and the medical consultants of the Army, Navy, and Air Force to submit manuscripts for publication in this journal.

FRANK B. BERRY, M. D.,  
*Assistant Secretary of Defense (Health and Medical)*

MAJOR GENERAL SILAS B. HAYS,  
*Surgeon General, United States Army.*

REAR ADMIRAL BARTHOLOMEW W. HOGAN,  
*Surgeon General, United States Navy.*

MAJOR GENERAL DAN C. OGLE,  
*Surgeon General, United States Air Force.*

# UNITED STATES ARMED FORCES MEDICAL JOURNAL

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## MANIFESTATIONS AND TREATMENT OF NERVE GAS POISONING IN MAN

DAVID GROB, M. D.

THE effects of nerve gas poisoning described below are those that have been observed in man after exposure to Sarin (brand of isopropyl methyl phosphonofluoridate).<sup>1-4</sup> Exposure to other organic phosphate anticholinesterase compounds, such as parathion, mipafox, tetraethyl pyrophosphate (TEPP), and hexaethyl tetraphosphate (HETP), which have been widely used as insecticides, results in the same manifestations,<sup>5-11</sup> and it is believed that the effects of other nerve gases, such as Tabun (brand of ethyl phosphorodimethylamide cyanidate) would be similar. The manifestations due to these compounds are entirely attributable to the inhibition of cholinesterase enzymes in the tissues, resulting in the accumulation of acetylcholine.<sup>12</sup> The treatment of poisoning caused by any of these compounds is the same, and the measures recommended for the management of nerve gas poisoning are also recommended for the management of poisoning due to other organic phosphate anticholinesterase compounds.

### ABSORPTION

The nerve gases may be absorbed through any body surface. Vapor, spray, or aerosol is readily absorbed through the respiratory tract or eyes, resulting in local effects on these tissues. If absorption through the respiratory tract is sufficiently great, this is followed by generalized systemic effects. Liquid nerve gases or solutions may be absorbed through the skin, conjunctivas, or gastro-intestinal tract, producing local and then generalized systemic effects.

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From Chemical Corps Medical Laboratories, Army Chemical Center, Edgewood, Md. Dr. Grob is consultant from Johns Hopkins University School of Medicine, Baltimore, Md.

## MECHANISM OF ACTION

The effects of the nerve gases are due entirely to their ability to inhibit cholinesterase enzymes throughout the body. Because the normal function of these enzymes is to hydrolyze acetylcholine wherever this compound is liberated, such inhibition results in the accumulation of excessive concentrations of acetylcholine at its various sites of action. These include the endings of the parasympathetic nerves to the smooth muscle of the iris, ciliary body, bronchial tree, gastro-intestinal tract, bladder, and blood vessels; parasympathetic nerves to the secretory glands of the respiratory tract and to cardiac muscle; and sympathetic nerves to the sweat glands. The accumulation of acetylcholine at these sites results in characteristic "muscarine-like" signs and symptoms (table 1). The accumulation of acetylcholine at the endings of motor nerves to voluntary muscle and in the autonomic ganglia results in "nicotine-like" signs and symptoms. Finally, the accumulation of excessive concentrations of acetylcholine in the brain and spinal cord results in characteristic central nervous system symptoms.

The inhibition of cholinesterase enzymes throughout the body by nerve gas rapidly becomes more or less irreversible, so that the effects of these compounds are prolonged. Until the tissue cholinesterase enzymes are restored to normal activity, probably by their regeneration over a period of days or weeks, there is a period of increased susceptibility to the effects of another exposure to any of the nerve gases. During this period the effects of repeated daily exposures by any route are cumulative.

## EXTENT OF DEPRESSION OF CHOLINESTERASE

Local ocular and respiratory manifestations may occur without any general depression of the cholinesterase activity in the plasma and red blood cells. If systemic manifestations occur, plasma and red blood cell cholinesterase will be found to be depressed, below 50 per cent of initial level of activity following inhalation of nerve gas vapor, below 30 per cent following ingestion of liquid, and below 15 per cent following percutaneous exposure to liquid. After marked depression, plasma cholinesterase gradually returns to the initial level of activity over a period of 30 days, and red blood cell cholinesterase over a period of 90 days. Following repeated exposure there is no correlation between the onset of symptoms and the precise level of cholinesterase activity of the plasma or red blood cells, which may be markedly depressed without symptoms necessarily ensuing.

## EFFECTS OF NERVE GAS VAPOR

Within a few minutes after exposure to nerve gas vapor there appear local effects on the smooth muscle of the eye and respira-

TABLE 1. *Signs and symptoms of nerve gas poisoning*

Site of action	Signs and Symptoms
<i>Following local exposure</i>	
1. Muscarine-like	
Pupils .....	Miosis, marked, usually maximal (pinpoint), sometimes unequal
Ciliary body .....	Frontal headache, eye pain on focusing, slight dimness of vision, occasional nausea and vomiting
Conjunctivas .....	Hyperemia
Nasal mucous membranes .....	Rhinorrhea, hyperemia
Bronchial tree .....	Tightness in chest, sometimes with prolonged wheezing expiration suggestive of bronchoconstriction or increased secretion, cough
<i>Following systemic absorption</i>	
Bronchial tree .....	Tightness in chest, with prolonged wheezing expiration suggestive of bronchoconstriction or increased secretion, dyspnea, slight pain in chest, increased bronchial secretion, cough, pulmonary edema, cyanosis
Gastro-intestinal .....	Anorexia, nausea, vomiting, abdominal cramps, epigastric and substernal tightness (? cardiospasm) with "heartburn" and eructation, diarrhea, tenesmus, involuntary defecation
Sweat glands .....	Increased sweating
Salivary glands .....	Increased salivation
Lacrimal glands .....	Increased lacrimation
Heart .....	Slight bradycardia
Pupils .....	Slight miosis, later more marked
Ciliary body .....	Blurring of vision
Bladder .....	Frequency, involuntary micturition
2. Nicotine-like	
Striated muscle .....	Easy fatigue, mild weakness, muscular twitching, fasciculations, cramps, generalized weakness, including muscles of respiration, with dyspnea and cyanosis
Sympathetic ganglia .....	Pallor, occasional elevation of blood pressure
3. Central nervous system.....	
	Giddiness, tension, anxiety, jitteriness, restlessness, emotional lability, excessive dreaming, insomnia, nightmares, headache, tremor, withdrawal and depression, bursts of slow waves of elevated voltage in EEG, especially on overventilation, drowsiness, difficulty concentrating, slowness of recall, confusion, slurred speech, ataxia, generalized weakness, coma, with absence of reflexes, Cheyne-Stokes respiration, convulsions, depression of respiratory and circulatory centers, with dyspnea, cyanosis, and fall in blood pressure

tory tract, and on the secretory glands of the latter. If the concentration of vapor is sufficiently great, the nerve gas is rapidly absorbed by the respiratory tract and carried throughout the body by the blood, resulting in widespread systemic effects.

**Local Ocular and Respiratory Effects.** These begin within one to several minutes after exposure, and include pupillary constriction, which may be maximal, conjunctival hyperemia, aching in

and behind the eyes, especially on focusing, slight dimness of vision, frontal headache, watery nasal discharge, and a sensation of tightness in the chest. Occasionally, twitching of the eyelids may occur. These local effects may last from 1 to 14 days.

**Systemic Effects.** These begin within several minutes. If exposure is lethal, death may occur within several minutes to several hours; if not, symptoms may persist from one to five days.

**Muscarine-like effects.** The sensation of tightness in the chest increases. Bronchial secretion becomes excessive, and may cause coughing, airway obstruction, and respiratory distress. Salivation increases and laryngeal spasm may occur. If the upper airway becomes obstructed by secretions or by laryngeal spasm, or if the bronchial tree becomes obstructed by secretions or bronchoconstriction, little ventilation may occur in spite of respiratory movements, and cyanosis and unconsciousness may ensue. Following inhalation of nerve gas vapor the respiratory manifestations predominate, but, if the exposure is not so overwhelming as to cause death within a few minutes, other muscarine-like effects appear, including sweating, anorexia, nausea, substernal "tightness" attributable to cardiospasm, abdominal cramps, vomiting, diarrhea, and involuntary defecation and urination.

**Nicotine-like effects.** With the appearance of moderate muscarine-like systemic effects, generalized weakness and muscular twitching, pallor of the skin, and moderate elevation of the blood pressure occur. Weakness of the muscles of the tongue and pharynx may aggravate upper airway obstruction. If the exposure is severe, there may be generalized paralysis, including the muscles of respiration.

**Central nervous system effects.** The earliest effects include tension, anxiety, restlessness, insomnia, excessive dreaming, and giddiness. If exposure is marked, headache, tremor, drowsiness, impairment of memory, slowing of reactions, apathy, depression, confusion, ataxia, slurring of speech, coma, disappearance of reflexes, Cheyne-Stokes respiration, convulsions, and central depression of respiration follow. The latter adds to respiratory embarrassment caused by weakness and airway obstruction. The blood pressure falls terminally, probably because of depression of the circulatory center.

#### EFFECTS OF NERVE GAS LIQUID

**Local Effects.** The local ocular effects are similar to the effects of vapor. There is no immediate local pain or irritation. Following ingestion of solutions containing nerve gas, the initial symptoms are usually gastro-intestinal. Nerve gas has no taste. Following cutaneous exposure, there is no local irritant change, but local sweating and muscular twitching may occur.

**Systemic Effects.** These are similar to the effects of vapor, but the sequence and time of onset of symptoms vary with the route of exposure. Respiratory and ocular symptoms are the first to appear after inhalation of vapor, gastro-intestinal symptoms after ingestion of liquid, and sweating after cutaneous exposure to liquid. The onset and progression of symptoms are most rapid after inhalation of vapor and slowest after cutaneous exposure to liquid. The duration of symptoms tends to be longest after the latter. Marked miosis occurs only if there has been local exposure to liquid or vapor.

### CAUSE OF DEATH

Death is caused by respiratory failure resulting from weakness of the muscles of respiration, central depression of respiration, and airway obstruction by bronchial and salivary secretions and perhaps by bronchoconstriction. If respiration is maintained artificially and secretions removed by postural drainage and suction, and diminished by atropine, the patient will usually survive unless the exposure has been so overwhelming as to produce depression of the circulatory center, with peripheral vascular collapse and fall in blood pressure.

### PREVENTION OF POISONING AND HANDLING OF CASUALTIES

The gas mask must be put on at once on signal, or if any of the following are noticed under conditions of potential exposure: a faint, sweetish, fruity odor; a feeling of tightness in the chest or difficulty in breathing; miosis, eye pain, or unexplained dimness of vision; muscular twitching; or other manifestations of nerve gas poisoning. If possible, the breath should be held until the mask is on and properly adjusted. It then must be worn until chemical test procedures indicate the absence of nerve gas and the all clear signal is given.

The standard (U. S. Army, M9A1) gas mask protects against the effects of vapor, which is not absorbed through the skin to a significant degree in ordinary field concentrations.<sup>13</sup> Liquid nerve gas penetrates rapidly through ordinary clothing or impregnated permeable clothing. However, absorption through the skin requires a period of several minutes, so that, unless the exposure is overwhelming, there should be sufficient time to remove contaminated clothing and to blot and wash away liquid on the skin.

Casualties who have been contaminated with liquid nerve gas may endanger unprotected personnel, so that attendants should wear a gas mask, and, if possible, protective heavy rubber gloves and aprons.<sup>14</sup> If conditions permit, aid stations should be established up-wind from the most heavily contaminated areas. Casualties must be undressed in the open, away from uncontaminated



patients, and contaminated clothing and equipment left outdoors, down-wind from the aid station.

## TREATMENT

### Life-Saving Measures

*Termination of exposure.* If the atmosphere is still contaminated a gas mask should be put on the casualty. Clothing contaminated with liquid should be promptly removed, and any liquid on the skin should be blotted with a cloth. The contaminated area should be rubbed with a fresh cloth soaked with water, and then washed with soap and copious amounts of water, if possible. If heavy contamination of a limb has occurred, a tourniquet may be applied just proximal to the contaminated area for 30 minutes, being loosened for half a minute at 10-minute intervals. If liquid nerve gas should get into the eye, instant action is necessary to save life. The head should be tilted back and water poured slowly onto the eye, while the eyelids are held open with the fingers. The patient should be instructed to hold his breath during this procedure, and his gas mask then put on.

*Atropine administration.* The appearance of any local or systemic signs or symptoms of nerve gas poisoning calls for the immediate injection of atropine. Because this drug inhibits the action of acetylcholine at its many sites of action, other than the voluntary muscles, it has a moderate inhibitory influence on the muscarine-like and central neural effects of nerve gas, but no appreciable influence on weakness and fasciculations. The action of 2 mg of atropine sulfate or tartrate begins 1, 5, or 20 minutes after intravenous, intramuscular, or oral administration, and is maximal in 6, 35, or 50 minutes. The effects of the drug administered in the same dose by any of these routes are about the same after absorption has occurred.

If symptoms of nerve gas poisoning are mild, 2 mg of atropine should be injected intramuscularly and repeated at 20-minute intervals until the muscarine-like symptoms due to nerve gas are relieved and signs of mild atropinization (dry mouth and skin) occur. If symptoms are moderately severe, 2 to 4 mg should be injected intravenously, or, if this is not feasible, intramuscularly, and repeated in doses of 2 mg at 3- to 8-minute intervals until the muscarine-like symptoms are relieved and signs of atropinization develop. If respiratory distress or convulsions are present, the initial dose should be 4 to 6 mg. In severe poisoning the effect of each injection of atropine may last only from 10 to 30 minutes. Atropine administration should be repeated at appropriate intervals to relieve muscarine-like and central neural symptoms due to nerve gas, and to maintain a mild degree of atropinization for at least 24 to 48 hours. In severe poisoning as much as

24 to 48 mg of atropine may be required. Once symptoms have become mild, atropine may be administered by mouth.

In the presence of systemic evidence of nerve gas poisoning there is increased tolerance for atropine, so that fairly large doses may be administered before signs of atropinization appear. However, in subjects who have absorbed little or no nerve gas, 2 mg of atropine produce mild symptoms of atropinization. A second dose of atropine produces moderate, but not incapacitating symptoms, while a third dose, administered within an hour, interferes with ordinary activity. Signs of overatropinization include dry mouth, thirst, hoarseness, dry flushed skin, dilated pupils, blurred vision, tachycardia, urinary retention, constipation, slowing of mental and physical activity, headache, giddiness, disorientation, hallucinations, drowsiness, and sometimes maniacal behavior. Body temperature may increase, particularly in a warm environment or after exercise. While overatropinization may be incapacitating, fortunately only extremely high doses endanger life. To avoid the administration of incapacitating doses of atropine to persons who have absorbed little or no nerve gas, the self-administration of atropine should be limited to 2 mg, and administration by personnel other than a medical officer limited to a total of 6 mg.

*Removal of bronchial and salivary secretions.* The casualty is placed in the prone position with his head to one side, and the foot of the litter or bed elevated to promote drainage. If airway obstruction occurs the tongue is pulled forward and secretions cleared from the mouth and pharynx manually and, if possible, by aspiration. An oropharyngeal or nasopharyngeal airway may be inserted, but will generally be tolerated only by unconscious or partly conscious patients. If the upper airway remains obstructed in spite of these measures and cyanosis ensues, an endotracheal tube may be inserted and suction carried out through a catheter passed through the tube.

*Artificial respiration.* If respiration is severely impaired, death will occur in a matter of minutes unless effective artificial respiration is begun immediately and maintained until spontaneous respiration is resumed. In casualties with severe poisoning this may require several hours of continuous artificial respiration. The technics of artificial respiration are described by Elam and associates in an accompanying article.<sup>15</sup> Oxygen should be administered whenever available. While atropine administration facilitates respiratory exchange by suppressing bronchial and salivary secretion and bronchoconstriction, and perhaps by diminishing central depression of respiration, it does not obviate the need for artificial respiration in the patient with severely impaired breathing.

### Symptomatic Treatment

Convulsions may not be entirely relieved but can be reduced in severity by adequate doses of atropine. If they should be so prolonged as to interfere with respiration and thereby endanger life, trimethadione (Tridione) should be administered intravenously in doses of 1 gram every 15 minutes up to a maximum of 5 grams. If trimethadione is not available or is ineffective, thio-pental sodium may be administered, but care must be taken to avoid overdose and depression of the respiratory center.

Apprehension may be diminished by 0.1 gram of pentobarbital sodium orally, and ocular symptoms may be relieved by the local instillation of 2 per cent homatropine hydrobromide or 1 per cent atropine. Penicillin should be administered to prevent or treat pneumonia in persons who have had severe respiratory depression or increased bronchial secretion.

### SUMMARY

The manifestations and treatment of poisoning due to nerve gas are very similar to those of other organic phosphate anticholinesterase compounds, including the insecticides parathion, TEPP, and HETP. The manifestations are entirely attributable to inhibition of cholinesterase enzymes in the tissues, resulting in the accumulation of acetylcholine. Ocular and respiratory effects may follow purely local exposure. Systemic absorption results in accentuation of the respiratory effects, in other muscarine-like symptoms, and in nicotine-like and central neural manifestations. Measures for prevention of poisoning include prompt masking and removal of liquid contamination from skin and clothing. Treatment consists of the administration of large doses of atropine, artificial respiration and oxygen when needed, and alleviation of airway obstruction.

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## THE PESTICIDE PROBLEM

"The introduction of pesticides to the agricultural market in ever increasing chemical complexity, quantity, and numbers has created a widespread interest in the possible dangers of consuming foods treated with these chemicals. By and large they are poisons, and injury can be expected when the dose ingested is excessive. Our major pharmacologic problem, however, is not the determination of the rather crude end point represented by death, but rather an evaluation of the continued use of the agricultural products treated with normal amounts of the pesticide. This hazard is dependent more specifically on the injury produced by ingestion of small amounts over long periods of time. We cannot compress into a few months an experiment dealing with a lifetime process. Our greatest problem therefore arises from the fact that evidences of safety must be obtained from the feeding of laboratory animals over their life span and then observing the effects produced by the chemical."

—O. GARTH FITZHUGH  
in *Antibiotics and Chemotherapy*  
p. 88, Feb. 1956

### TISSUE BANK PIONEER HONORED

The Navy League's Annual Award of Merit was presented to Commander George W. Hyatt, MC, USN, by Secretary of the Navy Charles S. Thomas at the Navy League Convention in May. Commander Hyatt was chosen for the award because of the large part he had played in organizing and bringing to its present eminence the Tissue Bank at the National Naval Medical Center, Bethesda, Md.

This project pioneered in developing the freeze-dry process of preserving human tissues so that they could be stored at room temperatures for later clinical use. Short-term preservation in nutrient media at ordinary household refrigerator temperatures is also utilized. A third method of preservation is slow or quick freezing, with or without water binders, for storage at dry ice temperatures until needed.

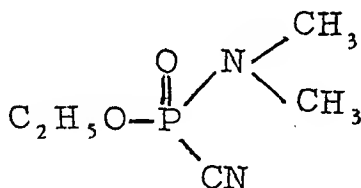
The Tissue Bank has rendered service of the greatest value, especially to military medical facilities but also to other governmental and civilian hospitals in the United States and even abroad. The arteries, bone, skin, dura mater, and other human tissues it has preserved and distributed have made possible many advanced surgical procedures. Large grafts of major arteries have been spectacular, while about 80 per cent of the services of the Bank have been in supplying to orthopedic surgeons material for notably successful bone grafts.

# CHEMISTRY, DETECTION, AND DECONTAMINATION OF NERVE GASES

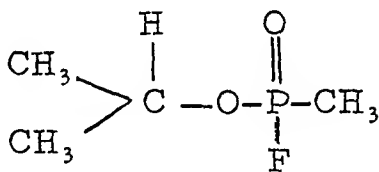
ALBERT A. KONDRITZER

**A**MONG the most toxic of potential chemical warfare agents are a group of organic esters of phosphoric acid derivatives. They were discovered in Germany prior to World War II through industrial research aimed at finding new and more potent insecticides. The high toxicity of these compounds, which have the property of irreversibly inhibiting the enzyme cholinesterase, brought them under military scrutiny as effective chemical warfare agents. Today a number of related but less toxic compounds, for example, tetraethyl pyrophosphate (TEPP), parathion, and malathion; are widely used in agriculture as insecticides and have caused a number of fatalities as a result of accidental poisoning.

The organic phosphorus compounds that are considered to have possible use as chemical warfare agents have been given the popular designation of "nerve gases," although they are not gases but volatile liquids. The chemical structures of two of these chemicals are given below.



Tabun (brand of ethyl phosphorodimethylamide cyanidate)



Sarin (brand of isopropyl methyl phosphonofluoridate)

## CHEMICAL AND PHYSICAL PROPERTIES

Tabun is a colorless to brownish liquid that gives off a colorless vapor having a faint, sweetish, fruity odor. The freezing point is  $-56^{\circ}\text{F}$  to  $-58^{\circ}\text{F}$ ; on heating, decomposition occurs below the estimated boiling point of  $459^{\circ}\text{F}$ . The vapor pressure is 0.070 mm Hg at  $77^{\circ}\text{F}$ . At this temperature a cubic meter of air is saturated by 570 to 610 mg.

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From Chemical Corps Medical Laboratories, Army Chemical Center, Md.

Sarin, when pure, is a colorless liquid that is volatile at ordinary temperatures, giving off a colorless and odorless vapor. The freezing point is  $-36^{\circ}\text{F}$  and the boiling point  $297^{\circ}\text{F}$ . The vapor pressure is 1.57 mm Hg at  $68^{\circ}\text{F}$ , at which temperature 12 grams saturate a cubic meter of air. Sarin is water soluble, being miscible with water in all proportions.

Tabun and Sarin are unstable in the presence of water. The instability is due to hydrolytic reactions, Tabun forming cyanide as one of its products, and Sarin yielding nontoxic products. The hydrolysis, comparatively slow by water, is catalyzed effectively by hydroxyl ion and much less so by hydrogen ion. In alkaline solutions of pH 12 or higher, hydrolysis is extremely rapid, but between pH 4 and 7 it takes place at such a slow rate as to be of little practical value in destroying either Tabun or Sarin. Other factors influencing the rate of hydrolysis are temperature, quantity of dissolved solids, and concentration of the agent.

### DETECTION

Sight and smell are of little value in detecting the presence of the nerve gases. Not only are their vapors colorless; Sarin also is odorless, and Tabun has only a faint fruity odor that may easily be masked by field conditions. In addition, the nerve gases are nonvesicant and nonirritating to the skin, so give no early warning by skin injury. As a result, *early detection by the soldier under field combat conditions is only possible through a knowledge of the signs and symptoms of poisoning*, as described by Grob<sup>1</sup> in the preceding article.

Objective detection of the presence of nerve gas depends on chemical or physical tests. Both Sarin and Tabun can be detected by the reactions discovered by Schoenemann, whereby cyano- or fluoro-phosphonate in the presence of peroxide in alkaline solution oxidizes ortho-tolidine to a dye. The accepted mechanism for this reaction postulates that the nerve gas reacts with perhydroxyl ion to form a perphosphonate intermediate which oxidizes the amine to a colored product. Many compounds capable of yielding colored derivatives under moderate conditions of oxidation have been evaluated at this Center as indicators in the Schoenemann reaction. Of these, indole and ortho-dianisidine have been found suitable for field detection of nerve gases. Physical methods and techniques, such as those based on spectrophotometric absorption characteristics, may also be adapted for this purpose.

To differentiate between the two nerve gases, other procedures must be used. Methods have been developed for separately identifying Sarin and Tabun by the reactions of their hydrolysis products. Detection of fluoride ion or hydrogen fluoride identifies Sarin, while Tabun may be identified through the cyanide ion,

hydrogen cyanides, or dimethyl amine. Chemicals, apparatus, and equipment have been assembled into special kits for detecting and identifying the nerve gases, as well as other likely chemical warfare agents, and for collecting samples of these agents for laboratory study.

The Chemical Agent Detector Kit, M9A2, has been designed for field use by combat troops to inform them when the protective mask may safely be taken off or when decontamination of an area has been accomplished after a gas attack. This kit is not intended to warn troops to mask in the event of a gas attack. It is a small, compact, portable unit, operable by one man. It provides for detection within several minutes of dangerous concentrations of nerve gas vapors, by a modification of the Schoenemann reaction that uses indole and sodium pyrophosphate peroxide as reagents. In the event of a positive test for nerve gas, identification of the agent as either Tabun or Sarin can be made with the Chemical Agent Analyzer Kit, M10A1. This is a portable unit developed for use by chemically trained men who are part of a laboratory team. With this kit, the presence of nerve gas in dangerous concentrations is confirmed by means of the color produced with sodium perborate and ortho-dianisidine, a more sensitive modification of the Schoenemann reaction than the one used in the Detector Kit. A cyanide reaction, specifically, color development in gamma-picoline with 1-phenyl, 2-methyl pyrazolone, is used to determine the presence of a cyanide-containing agent, *i. e.*, Tabun. The combination of a positive Schoenemann reaction and a negative cyanide test indicates the presence of Sarin.

## DECONTAMINATION

**General Principles.** Making a contaminated object, person, or area safe for unprotected personnel is accomplished by removal, destruction, detoxication, or covering the chemical agent. The object is to reduce the contamination to a permissible level with the least expenditure of labor and materials and in the time allowed. Decontamination may have to be performed by the individual on himself or his equipment, using whatever is at hand, or it may be done by personnel of his unit, under the supervision of persons specially trained and with material carried by the unit. When possible, however, it is done at decontamination points in maintenance areas, where thorough decontamination can be carried out by well-trained units.

**Personal.** Liquid nerve gases readily penetrate the bare skin and mucous membranes, and when systemically absorbed can be quickly incapacitating or lethal. In the presence of abrasions or open wounds, which are particularly vulnerable to rapid penetration, even a small dose of agent may be fatal. Decontamination procedures must be applied at once and these must not irritate



or damage the skin, either physically or chemically. Blotting unabsorbed agent from the skin is desirable, if absorbent material such as a handkerchief or one of the cloths from the Protective Ointment Kit M5A1 is available. Vigorous rubbing of the contaminated area must be avoided, because this will increase the absorption of the toxic agent. In any event, the contaminated area should be thoroughly flushed with a canteen of water. Washing with soap is desirable, especially when the skin is greasy or grimy. Solutions of sodium bicarbonate may be used instead of water for flushing the contaminated skin, but strong alkali and slurries or solutions of strongly alkaline bleach should be used cautiously or not at all. They may injure or irritate the skin and thus increase penetration. For similar reasons, organic solvents should not be used on skin contaminated with nerve gas.

Following decontamination, the area should be examined occasionally for local sweating and muscular twitching. If these occur, 2 mg of atropine should be injected intramuscularly via an uncontaminated area of the thigh or upper arm. The individual should continue his combat or other duties, as systemic symptoms of nerve gas poisoning may not occur or may be mild, if the decontamination was successfully carried out.

Liquid nerve gas in the eye constitutes a serious threat to life; as little as 0.01 ml-drop of Sarin can kill a man of average weight. Owing both to the rapidity and high degree of absorption by the ocular route, steps to remove the agent from the eye must be taken within 30 seconds. The canteen should be opened as quickly as possible, the head tilted back so that the eyes look straight upward and, while the contaminated eye is held open with the fingers, water poured slowly into the eye for not less than 30 seconds. This irrigation must be done in spite of the presence of nerve gas vapor, the breath being held as long as possible. Immediately after decontamination the protective field mask should be put on. During the next few minutes the pupil of the contaminated eye should be watched, and if it gets smaller, 2 mg of atropine should be injected intramuscularly at once. If the pupil does not get smaller, the ocular contamination may not have been by nerve gas and no atropine is needed.

**Clothing and Equipment.** Personnel who have to handle contaminated casualties and clothing and may thus come in contact with liquid nerve gas should wear protective clothing and protective masks. The impermeable protective apron (Apron Toxicological Agents, Protective) is intended for such use. The special purpose permeable protective outfit and impermeable protective gloves should be worn when the apron is used. Protective items that may be used in conjunction with the apron include protective mask, hood, and either rubber boots or leather boots treated with protective ointment. Rubber boots, however, should be worn when

contact with liquid nerve gas is anticipated. In an emergency when impermeable protective clothing is not readily available, the protective apron and glove may be worn over regulation clothing, but such an outfit must be worn with caution because it will not give a level of protection comparable to the full protection outfit.

At medical installations, prevention of injury to patients and medical attendants from clothing, blankets, or other equipment that has been contaminated with nerve gases is essential. Contaminated clothing and equipment should be removed from the casualty at the earliest practical moment. Casualties in clothing or blankets known to be contaminated should not be admitted to or removed from medical installations or other inclosed spaces, as this may result in serious injury to other patients and medical personnel, who may come in contact either with the liquid agent or the vapors given off by the contaminated materiel.

During land, air, and sea combat operations, decontamination of aprons and gloves will ordinarily not be possible either at aid stations or by medical units. Impermeable protective equipment which has become contaminated should be placed in a gas-resistant sack or gastight container for later decontamination.

Heavily contaminated impermeable aprons may be decontaminated by immersion in water at a temperature just below boiling for a period of one hour, after which they are dried in air. If the contamination is light or caused by vapor, the apron may be aired in the sun or wind for several days. The same principle applies to impermeable gloves; if they are heavily contaminated, immerse in boiling water for two hours, dry, and return to service. Care must be taken that the gloves are filled with water and that they are kept below the surface of the boiling water.

Gas masks that have been grossly contaminated with persistent nerve gases should be discarded. Masks that have been exposed to droplets or vapor may be decontaminated in an emergency by soaking the rubber parts of the mask in boiling water for four to eight hours. If the contamination has been with vapor only, the gas mask may be soaked for two hours at room temperature in water that has been made alkaline by the addition of sodium carbonate. After rinsing in water, the masks are dried and returned to service. The metal canister may be decontaminated by washing with soap and water or an alkaline solution of sodium carbonate. Gas masks carriers, first-aid pouches, and other web and canvas equipment may be decontaminated by soaking in boiling water for one hour. Shoes, straps, and other leather equipment may be decontaminated by soaking in water heated to a temperature of 122° to 131°F for four to six hours.

The following Department of the Army Technical Manuals were freely drawn upon in the preparation of this report, and may be consulted for a more detailed discussion of the principles and procedures described: TM 3-215, Military Chemistry and Chemical Agents, August 1952; TM 3-220, Decontamination, October 1953; TM 3-290, Individual Protective and Detection Equipment, September 1953; and TM 8-285 (NavMed P-5041, AFM 160-12) Treatment of Chemical Warfare Casualties, 1956.

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1. Grob, D.: Manifestations and treatment of nerve gas poisoning in man. *U. S. Armed Forces M. J.* 7: 781-789, June 1956.

#### SCIENTIFIC LINGO

"We should demand that technologic words never be used in scientific papers if familiar words can be used instead. To give an example, I showed my colleague, the Professor of Anatomy, the following passage: 'hypokalaemic hypochloroemic alkalosis was present.' He had no idea what it meant. Had the statement read: 'plasma potassium and chloride were diminished, CO<sub>2</sub> increased,' he would have understood. Here the simpler phrase is seven letters more. But editors are not always so particular in curbing verbosity. Moreover, another example from a recent paper by a very able and highly cultured author, 'bilateral nephrectomy was performed,' is not only less easy for a non-biologic scientist to understand than 'both kidneys were removed,' but is also 11 letters longer . . . . When we use a technologic term there is a strong tendency for the idea to become isolated and inaccessible to those periodic spring cleanings to which we subject our more ordinary mental furniture. Thus, by using a technologic term we often assume an entity where in fact none exists; the next process is to invent it. Thus, by using a technologic term, we may create an artefact."

— GEORGE W. PICKERING, M. D.  
in *Annals of Internal Medicine*  
pp. 926-927, Nov. 1955

# ARTIFICIAL RESPIRATION FOR THE NERVE GAS CASUALTY

JAMES O. ELAM, *Captain, MC, USA*

JOHN A. CLEMENTS, *M. D.*

ELWYN S. BROWN, *Captain, MC, USA*

NORMAN W. ELTON, *Colonel, MC, USA*

**S**UCCESS in resuscitation of nerve gas casualties will depend on advance planning, assembly of special equipment, and training of personnel in selected methods of artificial respiration, as well as on recognition of the physiologic responses to anticholinesterase compounds and the modifying effects of atropine. The purpose of this report is to recommend procedures for artificial respiration and to discuss their rationale.

Although there is a paucity of information regarding severe nerve gas poisoning in man, there is considerable experience with human exposures to anticholinesterase insecticides.<sup>1</sup> In general, the effects of severe exposure to these related agents are strikingly similar to the responses of animals to nerve gases, except for differences in the rate of absorption and progression of symptoms.<sup>2,3</sup> To a large extent, therefore, our concepts of therapy have been derived not from experience with nerve gas poisoning in man but from what is considered to be parallel information.<sup>4</sup>

Grob<sup>5</sup> has reviewed the mechanisms, symptomatology, and antidotal therapy of anticholinesterase agents in an accompanying article. From the standpoint of interference with normal respiration, we must consider a wide spectrum of cholinergic effects ranging from a mild sensation of tightness in the chest to an acute fulminant course characterized by unconsciousness, convulsions, bronchoconstriction, pulmonary vascular congestion, nasal and tracheobronchial hypersecretion, profuse salivation, emesis, laryngospasm, and apnea. The tempo of development of these severe manifestations depends on the amount and route of exposure, and on the rate of absorption of nerve gas vapor or liquid. Atropine in sufficient dosage will minimize some of these complications and will control others. In animal experiments, however, atropine, except in very large doses, has failed to bring about prompt reversal of central nervous system effects

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From Chemical Corps Medical Laboratories, Army Chemical Center, Md.

and the early return of spontaneous breathing. In any event, the proper management of artificial respiration requires anticipation and preparation for coping with all of the ventilatory hazards.

In considering the treatment of nerve gas casualties, two limiting facts must be emphasized: (1) The number of severe exposures may preclude effective care for all casualties, and (2) the severe and the moderately severe exposures will necessitate skilled and efficient attention by trained personnel. It seems that a minimum of one attendant per severe casualty will be required to effect successful resuscitation unless tracheal intubation is employed. This estimate is based on realistic experience with paralyzed, comatose, apneic patients in a general hospital. Maintenance of a clear upper airway, a prerequisite for any means of artificial respiration, demands virtually constant surveillance.

The management of the airway and of artificial respiration for field and hospital situations will be considered separately, because of great differences in availability both of special equipment and of specialized personnel.

#### PRINCIPLES OF EMERGENCY FIELD THERAPY

There are five essential principles that must be applied as expeditiously as possible: (1) protection, (2) decontamination, (3) atropinization, (4) assurance of patency of the airway, and (5) lung ventilation. The exposure should be regarded as severe if the casualty exhibits respiratory difficulty, convulsions, or loss of consciousness.

It has been estimated that with massive vapor exposure to Sarin (brand of isopropyl methyl phosphonofluoridate) the following symptoms will appear within 5 to 15 minutes:

Within 30 seconds . . . . .	Tightness in the chest Dizziness In-co-ordination
Within 1 minute . . . . .	Loss of consciousness Prostration Pinpoint pupils
Within 5 minutes . . . . .	Copious salivation Generalized muscular twitching Convulsions Obstructed upper airway Hypertension Flaccid paralysis Respiratory failure
Within 5 to 15 minutes . . . . .	Cyanosis Circulatory collapse Death

**Procedure.** Don gas mask. If feasible, transfer casualty to a noncontaminated area. For decontamination of liquid Sarin see the preceding article by Kondritzer.<sup>6</sup> Atropine should be administered immediately if available.<sup>5</sup> *Clear the pharynx of secretions quickly and inflate the lungs.* Continue artificial respiration until spontaneous breathing returns, unless circulatory failure has been established by cessation for five minutes of the carotid pulse and audible heart beat. Artificial respiration will have to be interrupted repeatedly for quick removal of additional mucus in the upper airway, until salivation has been checked by the action of atropine. The administration of atropine, preferably by intravenous route, should be repeated as long as salivation persists.<sup>5</sup>

With the onset of atropinization, the task of artificial ventilation becomes much easier. Less force is required to inflate the lungs, the airway remains dry, and the casualty resembles an anesthetized paralyzed patient in the operating room. He will probably require artificial respiration for a period of from 30 minutes to several hours, despite sustained atropinization. When spontaneous breathing returns he must be observed vigilantly, because he may lapse again into apnea. Should acute gastric dilatation develop incident to artificial respiration, the stomach must be immediately decompressed.

#### FIELD MANAGEMENT OF THE AIRWAY

**Patency.** Apart from the choice of methods to be employed for artificial respiration, the patency of the casualty's airway must be established and maintained. This primary requisite to successful resuscitation cannot be overemphasized.

The jaw muscles are apt to be in tonic or clonic spasm during the early phase following massive vapor exposure to Sarin. The casualty may resemble the patient in a grand mal seizure with the base of the tongue and epiglottis occluding the upper airway. In addition the pharynx becomes filled with thick salivary secretions. The high metabolic rate associated with convulsions accelerates the development of a deep cyanosis.

As soon as the operator is able to manipulate the upper airway, the oral cavity should be cleared of mucus. This is most rapidly accomplished by holding the mouth open and wiping the throat with cloth-covered fingers. The use of a catheter and syringe is theoretically sound, but probably too dilatory in practice. After quick removal of the major pool of secretions, the lungs should be inflated. Further cleaning of the airway is then carried out without inordinate periods of apnea.

**Artificial Airway.** The spastic tone of the jaw and pharyngeal muscles usually gives way to flaccid paralysis. At this time one of several artificial airways may be used. These include

the oropharyngeal airway, the nasopharyngeal airway, and the tracheotomy. None of these artificial airways guarantee a patent airway in the casualty. Insertion of an airway should not be attempted if the airway musculature is in spasm.

The oropharyngeal airway, if employed, must be of the proper size for the casualty. Its position must be checked, care being taken to ensure that the base of the tongue is elevated without the epiglottis being displaced posteriorly or against the larynx. This artificial airway should be changed for a smaller size or eliminated entirely if its presence evokes laryngospasm, stridor, or partial obstruction.

Frequently a nasopharyngeal airway relieves the obstruction without further complicating the problem, provided its tip lies in the pharynx and not in the esophagus. Recently improved nasopharyngeal airways have rounded instead of beveled tips and are less traumatic. These newer nasopharyngeal airways are less apt to produce bleeding from the nasal mucosa, a disadvantage of the older units.

In severe exposures the critical interval during which ventilation of the lungs is the essence of recovery precludes the use of conventional tracheotomy. The less severe casualties who may be observed for the gradual development of airway obstruction will probably be manageable by repeated removal of secretions from the air passage. In such persons the prone position with head down promotes gravity drainage of accumulating secretions.

The rapid tracheotomy technic of Shelden and associates,<sup>7</sup> employing their tracheotomy, makes this procedure feasible as an emergency one for the paralyzed cyanotic casualty. In addition, some means is required for inflating or diffusing air or oxygen into the lungs. Shelden and associates stated that the tracheotomy can be safely inserted in less than 30 seconds and that it could easily be used in the armed services by hospital corpsmen.

**Support of the Mandible.** To ensure airway patency and competent fit of the mask, the operator must elevate the mandible of the paralyzed casualty. This manual task necessitates continual attendance. In persons with flaccid muscles the temporomandibular articulation becomes freely mobile and allows the mandible and attached soft parts of the pharynx to move posteriorly and occlude the pharynx (fig. 1A). Repositioning of the mandible by manual traction is easily accomplished by applying forward traction to the angles of the mandible. Bilateral traction applied at points just below the ear lobes frequently results in temporary subluxation of the temporomandibular joint (fig. 1B). This purposeful subluxation, which affords optimal clearance of the ante-

rior soft parts of the pharynx, is not associated with damage to the joint or its ligaments. The most advantageous and efficient position of the operator's hands for support of the airway and mask is indicated in figure 1C. Force is required to secure the fit of the mask and effect a seal under the higher inflating pressures necessary to transfer air to the casualty's lungs. Equally

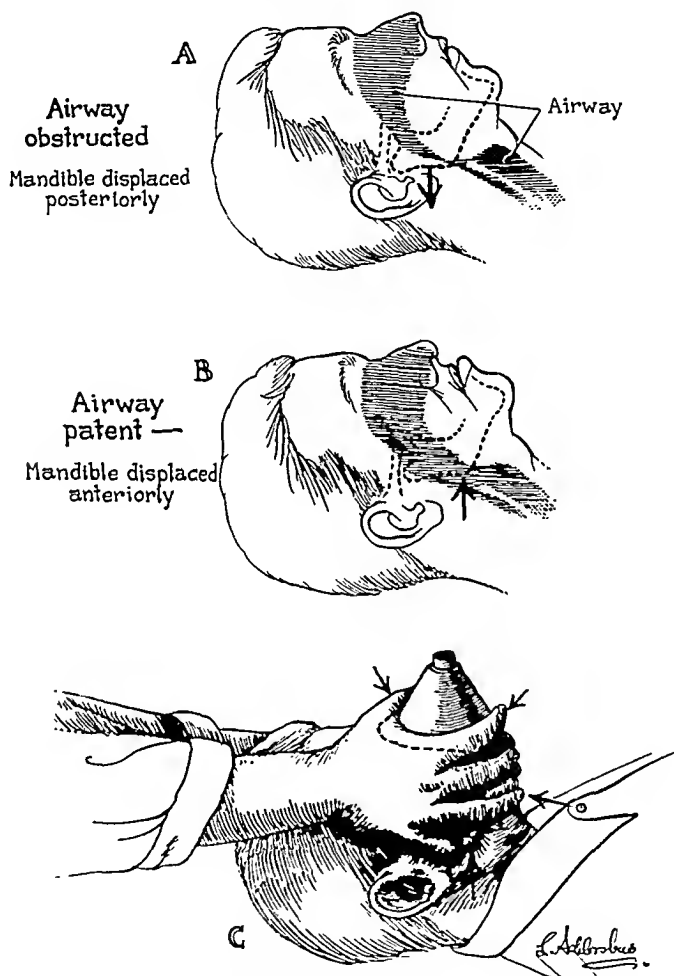


Figure 1. Support of airway and mask. The upper airway of the paralyzed person becomes obstructed primarily due to loss of tone in muscles which normally maintain the position of the mandible. (A) With relaxation the mandible slides posteriorly allowing the anterior soft parts (tongue, epiglottis, and pharyngeal muscles) to approximate the posterior pharynx. (B) Bilateral manual traction at the angles of the mandible (see arrow) elevates these structures. (C) This position must be maintained with the application of a mask. Strapping the mask on the head and neglecting this manual traction allows the airway to occlude as in (A).



important is the opposing force to elevate the mandible, in order to prevent obstruction. This requirement, in particular, renders tight strapping of a mask by means of a harness around the head likely to produce occlusion of the airway if the mandible is not manually elevated. Proper position and support of the jaw usually suffices to maintain patency of the airway without the use of an oropharyngeal airway.

### FIELD METHODS OF ARTIFICIAL RESPIRATION

**Manual Methods.** Although recent revision of the manual methods of artificial respiration<sup>1-13</sup> has improved their effectiveness, there is some doubt that any of the recommended procedures will provide sufficient force to ventilate the apneic nerve gas casualty. Depending on the severity of bronchoconstriction, thick secretions, and vascular engorgement of the lungs, it is anticipated that man may develop severe respiratory hindrance. Experiments in laboratory animals suggest that pressures as high as 50 millimeters of mercury may be required to effect transfer of air to the alveoli. The management of casualties resulting from severe exposure to Sarin vapor will require methods of artificial respiration capable, if necessary, of delivering the higher pressures efficiently. Should it be possible, however, to achieve good ventilation of the lungs by any manual method, this choice provides the simplest scheme for working in a contaminated area, because both operator and casualty may wear their standard gas masks.<sup>14</sup> On the other hand, should experience indicate the manual methods to be ineffective, two alternative procedures are available.

**Hand-Operated Bellows.** In skilled hands, this device is capable of developing the required pressures. It may be adapted for safe use in a contaminated area by adding a canister at the intake valve and making provision to prevent the recovering casualty from inhaling through the expiratory passage. The latter is not protected by a check valve in conventional models. The hand bellows is preferred by many anesthetists for emergency use and undoubtedly performs well in their hands, but the less experienced operator may expect considerable difficulty in holding the rigidly-coupled bellows-mask assembly on a mobile, mucus-laden, bearded face with one hand. We have observed that when such an operator attempts to deliver a volume by compressing the bellows with his other hand, either the mask rocks off the face to leak excessively or the force applied to compress the bellows is transmitted to the subject's mandible, producing occlusion of the airway. However, it is well established that with sufficient practice the hand bellows may be very effectively used to achieve good artificial respiration. To overcome the disadvantages of this unit for the neophyte, redesign of the mask-bellows coupling is required.

**Mouth-to-Mask and Mask-to-Mask Methods.** These modifications of the ancient procedure appear to be especially promising for management of the nerve gas casualty (figs. 2-4). The operator has both hands available to hold the mask tightly and to elevate the airway (fig. 1C). He is more intimately aware of the status of his efforts than when he executes either a manual method (which removes him considerably from direct observation of

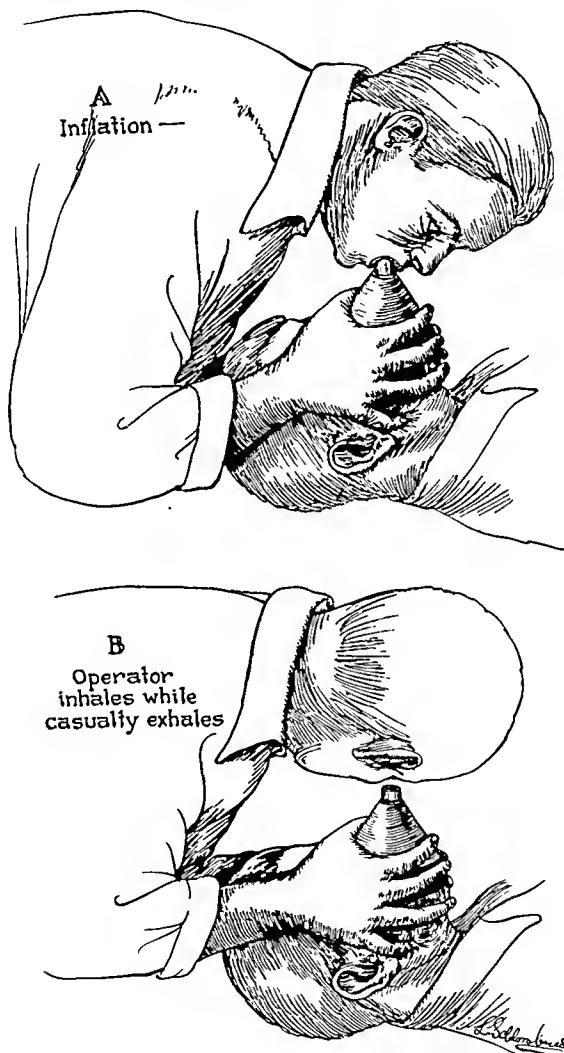
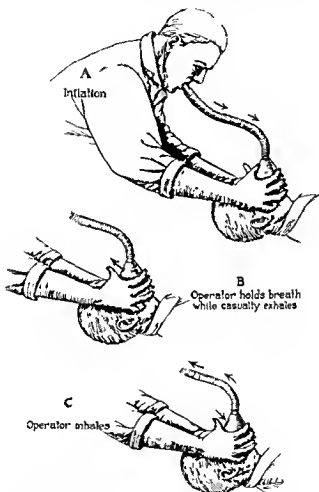


Figure 2. Emergency mouth-to-mask resuscitation (clean atmosphere). (A) The operator inflates the lungs of the casualty until visible expansion of casualty's chest occurs. (B) While the casualty exhales, the operator takes an inspiration of ambient air of about twice his normal tidal volume.

the chest) or the hand bellows. He can feel whether or not air moves into the chest. With each inflation of the casualty's lungs he can sense the pressure required and the presence of airway obstruction resulting from secretions or malposition of the tongue or epiglottis. Appropriate equipment for performing this method in a contaminated area is currently being developed. Until it becomes available, such an item may be improvised from a stand-



*Figure 3. Mouth-to-mask resuscitation for prolonged periods. This modification ensures freedom from severe hypoxia and associated dizziness of the operator, making it possible to continue artificial ventilation for several hours. The operator holds his breath between inflations while he allows the casualty to exhale through the opening in the mask. After the casualty's exhalation is completed, the operator inspires through the tubing.*

ard gas mask, a "mouthpiece" insert made of rubber tubing, a segment of breathing tube, and a rigid oronasal mask of the type used in anesthesia or on resuscitators (fig. 4C). The breathing

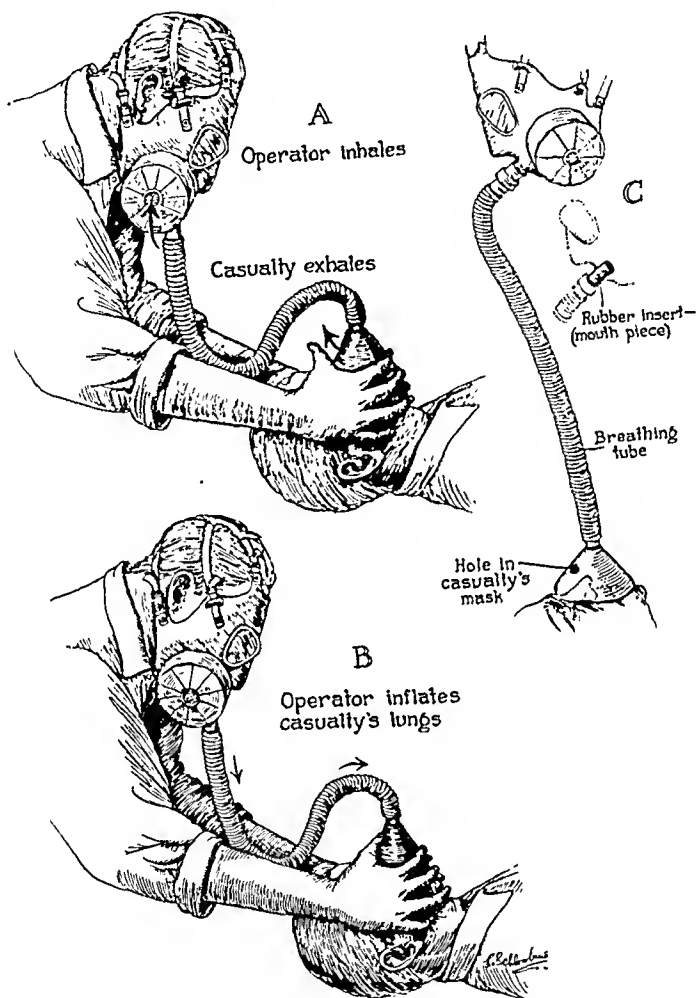


Figure 4. Improved equipment for use of mouth-to-mask method in a contaminated atmosphere. An extension tubing of about 300-ml volume is attached to the expiratory outlet of the M-9 protective gas mask and to an oronasal mask. A half-inch hole is placed in the oronasal mask in a position convenient for covering with the operator's thumb. This improvised assembly is completed by inserting a relatively stiff segment of rubber tubing three-fourths inch in diameter into the internal part of the expiratory port to serve as a mouthpiece (C). The cycle for this modification permits the operator to inhale while the casualty exhales (A) and to inflate the casualty's lung with the thumb occluding the hole in the mask (B).

tube, about 1 inch in diameter and 2 feet long, connects the expiratory outlet of the gas mask to the oronasal mask that is intended for the casualty. In the latter mask, a hole about one-half inch in diameter is cut to serve as a valve, which the operator occludes during inflation by means of his thumb and opens to allow the casualty to exhale passively. This sequence is illustrated in figure 4. Because standard gas masks show excessive outward leak at intramask pressures above 20 cm of water, it is necessary to slip a short segment of three-quarter inch, stiff, rubber tubing inside the expiratory outlet of the mask to serve as a mouthpiece around which the operator can effect a satisfactory seal (fig. 4C). When the casualty has been evacuated to a clean area, the mouth-to-mask method may be simplified by elimination of the breathing tube and operator's gas mask (fig. 2). Should the period required for artificial respiration be prolonged, the operator may experience dizziness associated with the excessive blowoff of carbon dioxide. Provision may be made to prevent this effect by using the breathing tube in the pattern shown in figure 3.

The efficacy of the mouth-to-mouth modifications has been found to be remarkably good, provided one important detail is observed: the operator must increase his breathing, or hyperventilate, while performing the method.<sup>11</sup> It is only in this way that he is able to compensate for the lower oxygen and higher carbon dioxide concentrations in his expired air. If he approximately doubles his normal ventilation, satisfactory respiratory exchange in the casualty is obtained.

Tests performed on models have demonstrated that untrained operators can carry out the required 15 to 20 inflations per minute for periods up to an hour, without undue fatigue. The human chest is surprisingly well set up for doing pressure-volume work. The models used for these studies simulated the maximal increases in pulmonary resistance and the maximal decreases in pulmonary compliance anticipated in severe nerve gas poisoning in man.<sup>12</sup> Operators of the mouth-to-mask method performed on this model complained, not of fatigue of the chest, but of the hands. The greatest difficulty encountered was that of holding the mask snugly on the face of the test manikin. This practical problem is common to all the methods considered feasible for artificial respiration in the field, in which higher pressures will be required. It is apparent, in attempts to master this limitation, that the operator can markedly increase his efficiency if he can have both hands to hold the mask and support the airway. For this reason, the mouth-to-mask methods would seem to have preference over other methods.

One of the most difficult and disconcerting problems is apt to be acute gastric dilatation. The presence of bronchoconstrict-

tion, necessitating delivery of gas at higher inflating pressures, favors the passage of air through the less resistive path down the esophagus. Animals poisoned by nerve gas, in which the mouth-to-mask methods were used, demonstrated rapid inflation of the stomach during the initial efforts to "open up" the constricted bronchi. Subsequently it was found possible by less zealous "blowing" to ventilate the lungs without inflating the stomach. Pressure applied over the cricoid cartilage may help to prevent gastric dilatation. If pressure is applied over the epigastrium, the operator must be alert to detect silent regurgitation of stomach contents, which may easily be forced into the tracheobronchial tree.

### PRINCIPLES OF THERAPY IN A HOSPITAL

Ideally a treatment facility should be set up that provides for the emergency use of a variety of measures. Equipment for endotracheal intubation, mechanical resuscitators, efficient aspiration pumps, and wide-bore catheters (at least one quarter inch in diameter) should be immediately available and operable. For the less severely exposed, the body respirator may be useful. In the very mild cases, oxygen therapy and atropinization alone may suffice.

Atropinization may be more effectively established by intravenous administration. Tonic or clonic convulsions with rigidity of the thoracic musculature constitutes a serious impediment to ventilation and causes increased oxygen demand. Attempts to control such effects with atropine are not apt to be successful and may lead to overatropinization. Grob<sup>5</sup> recommends the intravenous use of trimethadione as an anticonvulsant in preference to thiopental sodium because of its lesser respiratory depressant effect. The latter may be used, however, if trimethadione is not available, but should be given in small doses. The intravenous use of thiopental sodium in doses less than 25 mg has been observed to produce prompt control of chest muscle spasm in dogs poisoned with Sarin.

### MANAGEMENT OF THE AIRWAY IN A HOSPITAL

**Patency.** Secretions may be cleared efficiently by means of a suction catheter introduced through the nose or mouth. Because the major secretions are salivary, the resort to endotracheal intubation is particularly sound, especially if artificial respiration also is required. As mentioned earlier, postural drainage may suffice to eliminate secretions until atropinization supervenes.

**Tracheal Intubation.** This procedure is recommended in preference to tracheotomy because of a lesser likelihood of aspiration of secretions into the tracheobronchial tree. A cuffed endotracheal

ployed, the complication of acute gastric dilatation is likely unless a conservative schedule of initial inflations is used. In the organized treatment facility, the use of endotracheal intubation and mechanical resuscitators capable of delivering higher pressures are indicated.

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# PSYCHIATRIC SCREENING OF COMBAT PILOTS

BLAIR W. SPARKS, *Captain, USAF*  
OLIVER K. NIESS, *Brigadier General, USAF (MC)*

**A**MONG the many variables that must be considered in aircrew effectiveness is personality. The affective life of an individual has much to do with the levels of stress which he can endure, the motivation with which he attacks a goal, and the perseverance of his efforts in the face of hazards. It may be maintained that among the most fundamental determinants of combat superiority are personality factors; but even if this is true, we know far more about other factors in combat effectiveness than we do about emotion. Men who reach the stage of aerial combat see well enough to fight, fly well enough to fight, and have the physical endurance, at least for most of the missions in Korean combat. Selection in the Air Force in this area is rigorous and effective. However, the question every battle commander must ask himself is how emotion will affect the behavior of his men.

A survey of the famed 51st fighter wing (the Mig-killers) revealed, during one phase of the war, that about 50 per cent of their F-86 pilots had never fired their guns. Of the nearly 50 per cent who had fired their weapons, only about 10 per cent had ever hit anything. The basis for the difference between the 10 per cent effectives and the remainder includes, along with superior vision and other variables, personality functions for the combat task of a superior but as yet undetermined sort. What these personality functions or psychodynamics are, precisely, is at present only vaguely understood. If human beings were robots, one could measure their strength, plot their course, and predict accurately the outcome of battle in terms of the physical factors involved. Since they are not, and since we at present know so little about these affective factors, some very surprising things occur in the combat world. So much so, that combat commanders in the past have been known to conclude that only the acid test of combat itself will satisfactorily determine the behavior of their men under combat. Men who have been shy and timid have developed into "tigers," and men who have all their lives bullied and dominated others about them have cowered in fear and panic. Individuals

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From Headquarters, Far East Air Forces. Capt. Sparks is now assigned to Atomic Bomb Casualty Commission, Hiroshima, Japan.



who previous to combat have had rather stable personalities have found themselves filled with crippling anxiety in combat; men tormented with fears and tensions have found deep gratifications in the release of aggression. Through combat, individuals who previously had never been bothered with interpersonal conflicts have found themselves violently hostile to leaders and colleagues.

One of the major difficulties facing the investigator of behavior under such conditions is the fact that combat itself is subject to variable types of emotional stresses. Few men can view combat objectively. As in other areas of human behavior where emotions are involved, the investigator must watch lest his own security needs color his findings. An act of heroism is a remarkable event in human affairs. Glory and honor surround it. Yet those who study combat know that sometimes men are heroes as a result of feats performed in states of panic and fear. For this and other reasons, it is most difficult for researchers who have never seen or experienced combat to understand the nature of the stresses involved.

### PAST RESEARCH EFFORTS

The Air Force Medical Service has for several years conducted research on the problem of the psychiatric casualties that occur under combat stress in aerial warfare. This research effort has been largely directed toward the obtaining of group psychologic test data which could be used in conjunction with clinical appraisals for the screening of individuals who were likely to do poorly or to break down under the stresses of training and/or combat. Something over 5,000 men have been studied at cadet level, and predictions were made as to how each of these men would perform under training and/or combat stress.

As adequate criterion data were lacking, predictions were made largely from hypotheses which were presumably based on evidence obtained from the psychiatric studies of World War II combat pilots. The hypotheses used are of the sort which reflect traditional military and psychologic concepts of stability and endurance factors in personality. The hypotheses included, as positive for combat success, evidences of maturity, stability, and responsibility—traits that would ordinarily make up what might be thought of as an ideal officer and gentleman. Negative factors were evidences of psychopathology, neurotic tendencies, instability, or lack of responsibility, that is, behavior that would make up what would usually be thought of as typical of disturbed, psychopathic, or immature individuals. Most of the traits used in these predictions were of a surface sort, and deeper dynamics of personality were largely ignored.

### FOLLOW-UP STUDY

In February 1953, a research team was organized and sent to the area of the Korean conflict to follow as many of these 5,000

pilots into the combat zone as possible, in order to determine their proficiency under combat stress.\* To our knowledge, this may be one of the few occasions where men who had been studied previous to combat were then followed up in combat to determine their success at their tasks.

One hundred and eleven of the previously studied 5,000 pilots were located and studied in the combat zone. The data obtained included combat proficiency ratings by squadron commanders, operations officers, and peers; objective performance data from the squadron files; and clinical appraisals of proficiency in combat, plus any information available on the men's emotional life. Only four of these 111 pilots were found to be actual psychiatric failures in combat. Of the four failures, one was a psychopath, one had a severe anxiety reaction, one was an alcoholic, and one was at least a borderline psychopath who, concluding after the first mission in combat that people "got killed doing this," asked for and obtained release from his combat duties. The investigators attempted to make as thorough a study as possible of each pilot where found in the combat zone. The data thus obtained concerning each pilot's proficiency in combat has since been correlated with the previously obtained test results and the predictions made previously for these same individuals. Sufficient data for analysis was obtained for 65 of these pilots. Interestingly enough, the top jet ace of the study (a double ace) was a predicted failure. The four failures were all predicted successes. A correlation between the predictions of the training level psychologists and the combat proficiency estimates of the combat psychologists was  $-.43$ , significant at the 5 per cent level of confidence.

The pilot Stanine test yielded only one coefficient ( $+.35$ ) of marginal significance (10 per cent level of confidence) between combat psychologists' final appraisals and Stanine scores. Correlations of peer-superior ratings of flying proficiency in training and combat were significant at the 1 per cent level of confidence between training upper classmate ratings and combat peer-superior ratings on the trait of likeability ( $+.57$ ) and between training classmate ratings of flying proficiency and the combat psychologists' final ratings of proficiency in combat ( $+.52$ ). Previous

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\*Maj. Jack Kavanagh, USAF (MC), then Head of the Department of Psychiatry, School of Aviation Medicine, Randolph Air Force Base, Tex., and Maj. John Mebane, USAF (MC), also of the same department, served as consultants to this team, and each spent one month in the combat zone. The team was composed of a clinical psychologist and a senior flight surgeon who was a psychiatrist and formerly wing surgeon of the famed 51st fighter wing at K-13 in Korea. The latter, Dr. Frederick J. Hinman, now psychiatrist at Veterans Administration Hospital, Denver, Colo., contributed much to the success of this mission. These two men, assisted by a Medical Service Corps officer and an enlisted man, traveled extensively throughout the combat zone carrying out these criterion studies during the last six months of the Korean conflict.

psychologic test data, clinical appraisals, and predictions failed to correlate at a significant level of confidence with either the objective combat data or the presumably valid estimates of squadron commanders, operations officers, and peers in combat.

However, the correlation between the combat psychologists' estimates of proficiency and the mean combat proficiency ratings of squadron operations officers, commanders, and flying colleagues was  $+0.78$  (1 per cent level of confidence); that between the combat psychologists and the training psychologists was  $-0.32$  (5 per cent level of confidence) (table 1).

TABLE 1. *Correlations between proficiency estimates for 65 combat pilots in the Korean conflict<sup>1</sup>*

Combat proficiency rating traits	Peer-superiors vs. combat psychologists		Peer-superiors vs. training psychologists	
	Coefficient of correlation	Significance*	Coefficient of correlation	Significance*
Competence	$+0.65$	1	$-0.26$	
Fairness	$+0.54$	1	$-0.38$	
Courage	$+0.30$	1	$-0.13$	
Responsibility	$+0.51$	1	$-0.20$	
Likability	$+0.68$	1	$-0.29$	10
Discipline	$+0.55$	1	$-0.24$	
Mean	$+0.78$	1	$-0.32$	5

\* Per cent level of confidence.

## RESULTS

The results seem to indicate that the psychologists at training level understood neither the nature of combat stress and its effect on personality nor the psychic variables which constitute probable success or failure. The fact that their estimates were in significant disagreement with the estimates of both combat peer-superiors and combat psychologists indicates that the hypotheses on which their predictions were made were significantly in error. It is important to note also that the predictions were made in the opposite direction. The fact that the combat psychologists' estimates agreed in general with the peer-superiors' estimates indicates a most essential need for investigators in this area to have a realistic understanding of combat, since training researchers tended to predict successes to fail and failures to succeed. The results support the hypothesis that predictions of combat proficiency, based on psychiatric data adequately oriented to combat, can be made with sufficient precision to be of value in screening.

The fact that only four of 111 pilots did fail indicates, however, that whatever screening technics were being used for these pilots were functioning rather well.

It is recommended that adequate criterion data for this research effort be obtained. The significant (1 per cent level) positive correlations between the clinical appraisals of the combat psychologists and the peer-superior appraisals indicate that there may be cause for hope that it would be possible, given sufficient insight into personality as involved in combat stress, to do a better job of psychiatric screening for combat duties than has been done heretofore. The combat data obtained in Korea certainly suggest that there is a real question as to whether stability as conceived of in civil society is an adequate basis for psychiatric screening for combat duties. Investigations should be made concerning the specific effects of intense, prolonged fear and of how they involve their unconscious companion, anxiety; as well as of the effects of intense, prolonged hostility and release of aggression, and of how they involve their unconscious companion, guilt. How do these emotions affect the structure and stability of the personality as the ego strives to maintain integrated behavior for survival and success at combat? From this perspective, some men with rather disturbed personalities may be more insulated against crippling anxiety in combat than are some normal persons, even though the combat data from Korea indicates that pilots without symptoms tended to do better.

If it is true, as postulated here, that we do not as yet understand many of the basic psychodynamics of combat proficiency, how then are we to screen out those predisposed to breakdown? The present situation seems to be that we are only able to identify those who prove themselves unable to carry out their duties for psychiatric reasons, or appear to evidence a high immediate probability of not being able to do so. Even here caution is called for. In this study there were a number of highly disturbed individuals who not only were carrying on but were doing so in a superior manner, and who finished their tours successfully, although the cost to them in anxiety was very high. In some instances the very anxiety involved appeared to contribute considerably to the performance of the pilot. In this regard it was interesting to note that some men with obsessive-compulsive personalities did very well in B-29's, but none were seen to do well in fighters; conversely, a number of those with "psychopathic personalities" did splendidly in fighters but were not seen to do well in bombers. Possibly there are elements of stress which vary from task to task, so much so that men with certain personality syndromes are better equipped for certain types of combat flying.

In the Korean conflict, as in all wars fought by the United States, great men appeared on the horizon of combat: Gabreski,

Fernandes, Fisher, Jabara, McConnell, and others too numerous to mention here. Sometimes outnumbered, they met the Mig—sometimes with the F-86, sometimes in a slow, aged bomber, and sometimes in a "chopper." Their record is one in which they defeated the enemy with amazing scores. It was our great privilege to have known them. We could not fail to note that against the enemy's superior numbers in the north, these superior pilots from the south won and kept control of the North Korean sky, all the way to the Yalu.

### SUMMARY

Psychiatric screening for combat duties, based on training level group psychologic test data and/or clinical appraisals as used in the project discussed here, appears as yet unable either to screen out the failures or to identify the successes in combat flying. At present, careful, "on-the-spot" psychiatric evaluations by a psychiatrist, collaborating with a flight surgeon who lives and flies with these pilots, can probably give us the best psychiatric opinion available on the combat proficiency of a given pilot on a given combat tour or mission. Beyond this we cannot go very far with certainty.

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### WATER FLUORIDATION AT ARMY POSTS

Fluoridation of drinking water at 21 Army posts in the United States, Alaska, Hawaii, and Puerto Rico has been approved as of 2 April 1956, it was announced by Major General Silas B. Hays, Surgeon General, United States Army.

The fluoridation of drinking water at Army installations lacking the natural fluorine necessary for oral health was approved by the Army Medical Service in July 1954. Through the co-operation of the Corps of Engineers, the fluoridation equipment and engineering skill required to install the process are assured. Each military post must obtain both the approval of The Surgeon General of the Army and the endorsement of the Corps of Engineers.

Regulations now in effect to control the granting of requests for fluoridation have a global application. The program is expanding and no change in Army policy is anticipated in the foreseeable future.

# EPIDEMIOLOGIC STUDIES OF HISTOPLASMIN SENSITIVITY

HARRIS D. RILEY, Jr., Captain, USAF (MC)

THE HISTORY of histoplasmosis may be arbitrarily divided into two periods. The first began in 1906 when Darling,<sup>1</sup> in Panama, described three cases of illness caused by *Histoplasma capsulatum*, which he thought to be a protozoon. In this period the disease was regarded as extremely rare and invariably fatal. The organism was cultivated and identified as a yeastlike fungus by DeMonbreun<sup>2</sup> in 1934. The second period began in 1941 with the development of a specific cutaneous test.<sup>3</sup> This intradermal histoplasmin test opened new channels of investigation which resulted in the discovery that the infection commonly exists as a widespread but subclinical and benign disease.

The enigma of pulmonary calcification in tuberculin-negative individuals had stimulated wide interest and caused doubt to be cast on the assumption that only in the very exceptional case would a person previously infected with tuberculosis fail to react to strong concentrations of old tuberculin.<sup>4-9</sup> The enigma was solved in 1945 when Christie and Peterson<sup>10, 11</sup> demonstrated an immunologic relationship between histoplasmin sensitivity and pulmonary calcification that has been confirmed repeatedly.<sup>12-17</sup> From these and other studies, evidence has evolved that infections with *H. capsulatum* may be benign and asymptomatic and rarely recognized clinically. Reports of vital statistics<sup>18, 19</sup> also point up the important role of histoplasmosis. In 1946-1948 no deaths due to this infection were recognized, but 33 fatalities were reported in 1949. It was estimated in 1948 that in children in the East Central United States, histoplasmosis (as indicated by a positive skin test) is almost 10 times as prevalent as tuberculosis.<sup>20</sup>

Many studies, such as that of Mochi and Edwards,<sup>21</sup> on the prevalence of histoplasmin sensitivity in all parts of the world have been reported. Most of these investigations, however, have concerned adults and almost exclusively residents of one particular geographic area. Few studies have concerned individuals

From U. S. Air Force Hospital, Sewart Air Force Base, Tenn. Capt. Riley is now at Vanderbilt University School of Medicine, Nashville, Tenn.

coming from areas of low prevalence of histoplasmosis into one of high prevalence, and no such study specifically concerning infants and children has been reported.

The pediatric dependents of military personnel arriving at this Air Force base in middle Tennessee afforded an opportunity to study the problem, because Tennessee, especially middle Tennessee, is an endemic area for histoplasmosis with a high prevalence rate of histoplasmin sensitivity.<sup>13,14,22,23</sup> The children studied had lived in all parts of the United States and in some cases in other countries, and had then moved into this area of high incidence. In addition to histoplasmin sensitivity, the prevalence of tuberculin sensitivity in this heterogeneous group of children was determined.

### PLAN OF STUDY

For approximately a one-year period, children\* who reported to the military dependents clinic of this hospital for medical attention were given intradermal tests with histoplasmin and old tuberculin, and a detailed residence history from birth to the time of testing was recorded.

**Subjects.** A total of 663 subjects between the ages of birth and 15 years were tested on their first visit. No attempt was made to include children from specific age groups; however, infants below 1 year of age were not tested routinely, and only 28 were included in the total. The majority of the subjects were in the age group of 1-7 years, because the fathers were young military personnel and their children tended to be younger than the clientele of the average civilian pediatric clinic.

**Location of Study.** This study was conducted in the northwest section of Rutherford County, which lies in the so-called Central Basin, a fertile farming area with rolling terrain and several rivers and streams. The average altitude is about 600 feet, the average annual rainfall 49 inches, and the average relative humidity 67 per cent. Figure 1 depicts the geographic relationships of the locale.

**Antigen, Method of Testing, and Interpretation of Tests.** Histoplasmin in 1:100 dilution, obtained from the filtrate of a culture of *H. capsulatum*,\*\* and old tuberculin 1:1000 dilution were used in 0.1-ml doses throughout the study, employing the technic of testing described by Christie and Peterson.<sup>19,21</sup> Only fresh

\*Children\* also includes infants below one year of age, unless specifically stated.

\*\*Obtained from Department of Pediatrics, Vanderbilt University Hospital, Nashville, Tenn. This dilution is equivalent to 1:1000 of histoplasmin (Lilly). For comparison with other histoplasmin antigens, see Shaw, L. W.; Howell, A., Jr.; and Weiss, E. S.: Biological assay of lots of histoplasmin and selection of new working lot. *Pub. Health Rep.* 65: 583-609, May 5, 1950.

June 1956)

batches of histoplasmin and tuberculin of known potency were used. Separate needles and glassware were used for each antigen, and the equipment was cleaned and autoclaved separately to avoid subsequently using a syringe and needle for histoplasmin testing that had been used previously for tuberculin.

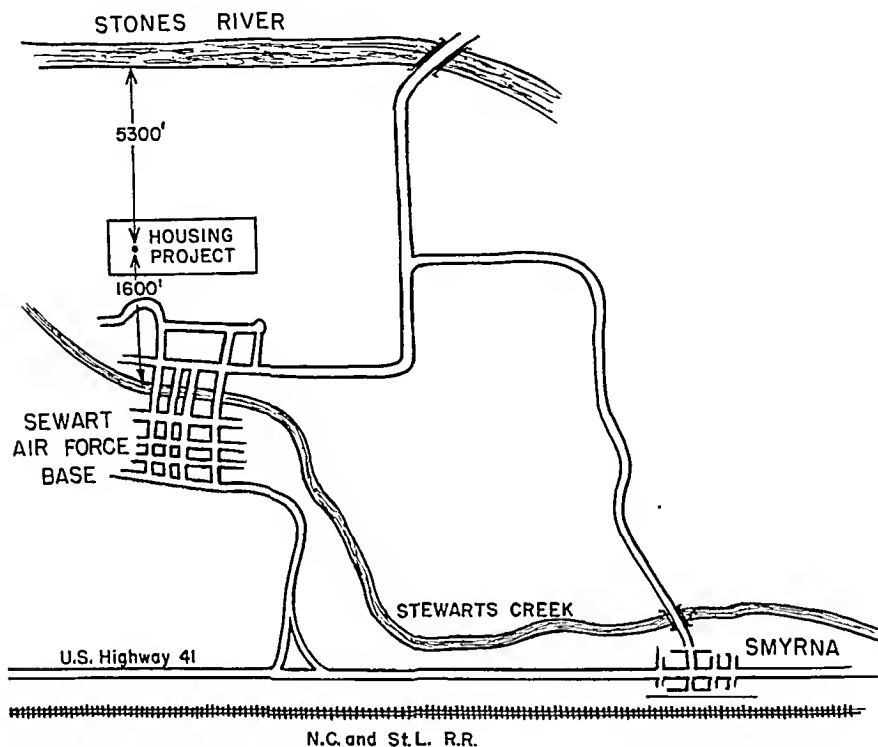


Figure 1. The geographic relationships of the locale in which the study was conducted.

Tests were read in 48 hours, by the author in the majority of the subjects. A positive reaction to either test was considered as one in which erythema and induration measured 5 mm or more. If either test was negative after 48 hours, the parents were instructed to bring the child to the clinic at 72 hours after testing, in case there was any evidence of erythema or induration. If either test was negative at 48 hours but unequivocally positive at 72 hours, it was recorded as positive.

Rigid criteria were used in classifying reactions and all equivocal tests were repeated, usually on the opposite forearm. If this was definitely positive, it was recorded as an initial positive, the original borderline test not being considered as an



"initial test" nor the second test as a "repeat." Those tests that remained equivocal are not included in this report.

In the great majority of instances, the subjects were tested within a short time after arrival in this locale, chiefly because of a local base regulation strongly urging typhoid and tetanus immunizations for all children as soon as possible after arrival.

Most of the test subjects resided in a housing project adjacent to the hospital (fig. 1) and could easily return for interpretation of skin reactions. In the few cases where it was impossible for the child to return at 48 hours, the parents were carefully instructed in drawing on a form the size of the reaction at the end of 48 and 72 hours. Comparison in a pilot group of the parent's interpretation and those of the author indicated satisfactory correlation. If the parents had any doubt as to the reaction, they were asked to have a physician interpret it or to return to the clinic.

**Residence History and Regional Classification.** At the time of the initial testing, a detailed residence history was recorded giving the exact locations of residence since birth, the length of residence in each site, and the date of arrival in this locale. Adequate residence data was obtained on 583 (87.9 per cent) of the 663 children. At the initiation of the project, the United States was divided into regions (fig. 2), a modification of the geographic divisions used by Palmer<sup>17</sup> and by Beadenkopf et al.<sup>18</sup> If a child had spent as much as 70 per cent of his life in one particular region, he was recorded as "having spent the majority of his life" in that region. Those who had spent less than 70 per cent of their lives in any one region were placed in a special classification and the duration of stay in each region recorded. This group was not included in the category of known residence data but was combined for purposes of analysis with the group of "no record" in tables 1 and 2. Of the 583 subjects on whom adequate residence data was obtained, 498 had spent 70 per cent of their lives in one particular region, and 85 had lived in several regions but not as much as 70 per cent of the time in any particular one. The percentage chosen to represent "majority of life" is a purely arbitrary one, but is approximately the same as that used in other similar types of investigation.<sup>17, 18</sup>

**Retesting for Histoplasmosis.** Because of the obvious interest in determining the rate of acquisition of the infection by persons who, in many cases, had come from an area of low endemicity of histoplasmosis into a known endemic area, 234 of the subjects who had been negative on initial testing were retested at various intervals. The results of this phase of the investigation will be reported separately.

**Roentgenographic and Serologic Studies.** A roentgenogram of the chest was obtained on each patient who had a positive intradermal reaction to either tuberculin or histoplasmin. This was repeated as clinically indicated. In a few selected cases, histoplasmin complement fixation studies also were performed.\* These determinations could not be made at the military installation where the study was conducted, and due to technical difficulties in transporting specimens too few were obtained to be statistically significant.

## RESULTS AND DISCUSSION; HISTOPLASMOSIS

**Age Factors and Geographic Influences.** The rates for histoplasmin sensitivity reported in table 1 are not as high as those found in children of the same age range *residing* in the central section of the United States,<sup>13-16, 22, 25</sup> because a large number of our subjects came from areas where histoplasmosis is virtually nonexistent and were tested soon after arrival. We tested only 28 infants below the age of 1 year, but found no positive reactors, as compared with an incidence of 1.9 per cent<sup>22</sup> for residents of adjoining Davidson County and of 26.6 per cent<sup>13</sup> for residents of Williamson County, which also adjoins the county in which our study was conducted. Our rates of 1.2 per cent at ages 1-2, 13.4 per cent at ages 2-5, and 18.3 per cent at ages 5-10 contrast with rates for Davidson County *residents* of 18.7, 27, and 50, respectively.<sup>22</sup> In all studies, the sensitivity rates have been observed to increase with age, and are higher in young adults than in children living in the same locale.<sup>15, 17, 25-28</sup>

It is important that the rate of histoplasmin sensitivity be correlated not only with age but also with site of residence. The exact geographic distribution of histoplasmosis has not yet been determined, but fairly well defined endemic foci have been outlined, although the subjects of most previous studies have been adults. In the United States the infection, as determined by skin sensitivity, is highly prevalent in the central portion of the Mississippi River Basin. This region corresponds closely to the geographic distribution of pulmonary calcification.<sup>14, 16, 17, 21, 22, 39-41</sup> Some lesser endemic foci exist in the Middle Atlantic States, in the Potomac and St. Lawrence River Valleys, and in sections of North Carolina. The disease has also been reported from Central and South America and less frequently from Europe, Africa, and the Far East (fig. 3). In parts of Tennessee, Missouri, Kentucky, Illinois, and adjoining states a high percentage of the population are histoplasmin positive by the time they reach puberty, while the further removed from the central Mississippi River Basin the less frequent histoplasmin sensitivity be-

\*Through the courtesy of the Laboratories, Department of Pediatrics, Vanderbilt University School of Medicine, Nashville, Tenn.

comes.<sup>14, 16, 17, 21, 22, 32, 42</sup> Distinct intra-state differences have been described.<sup>17, 22, 26, 36, 38, 37</sup>

TABLE I.  
HISTOPLASMIN SENSITIVITY, INITIAL TESTS

Classification	Number Tested	Histoplasmin Positive	
		No.	%
Total	663	93	14.0
Sex			
Male	341	45	13.2
Female	322	48	14.9
Age			
<1 year	28	0	0.0
1 year	83	1	1.2
2 years	232	31	13.4
5 years	262	48	18.3
≥10 years	58	13	22.4
Residence in Region IX *			
<1 year	157	7	4.5
1 year	138	17	12.3
2 years	78	18	23.1
3 years	49	13	26.5
4 years	26	6	23.1
≥5 years	50	11	22.0
No Record	165	21	12.7
Major Region of Residence **			
USA, I	18	1	5.6
II	20	3	15.0
III	50	11	22.0
IV	257	44	17.1
V	91	10	11.0
VI	27	2	7.4
Foreign ***	35	1	2.9
No Record	165	21	12.7

\* Region IX is composed of the states of Tennessee, Kentucky, Ohio, Indiana, Illinois, Missouri, and Arkansas. (see figure 2).

\*\* For states contained in the various regions, see figure 2.

\*\*\*The 35 children with major foreign residence are detailed as follows: 13 Germany, 4 Newfoundland, 3 Alaska, 3 Hawaii, 3 Japan, 3 Canada, 2 England, 1 Brazil, 1 Panama, 1 Okinawa, 1 South Pacific.

From table 1 it is seen that children who had spent the major portion of their lives in states of the western Appalachian slope and states bordering the Mississippi and Ohio Rivers had a higher prevalence of histoplasmin sensitivity than those coming from other areas. This is most notable with respect to previous

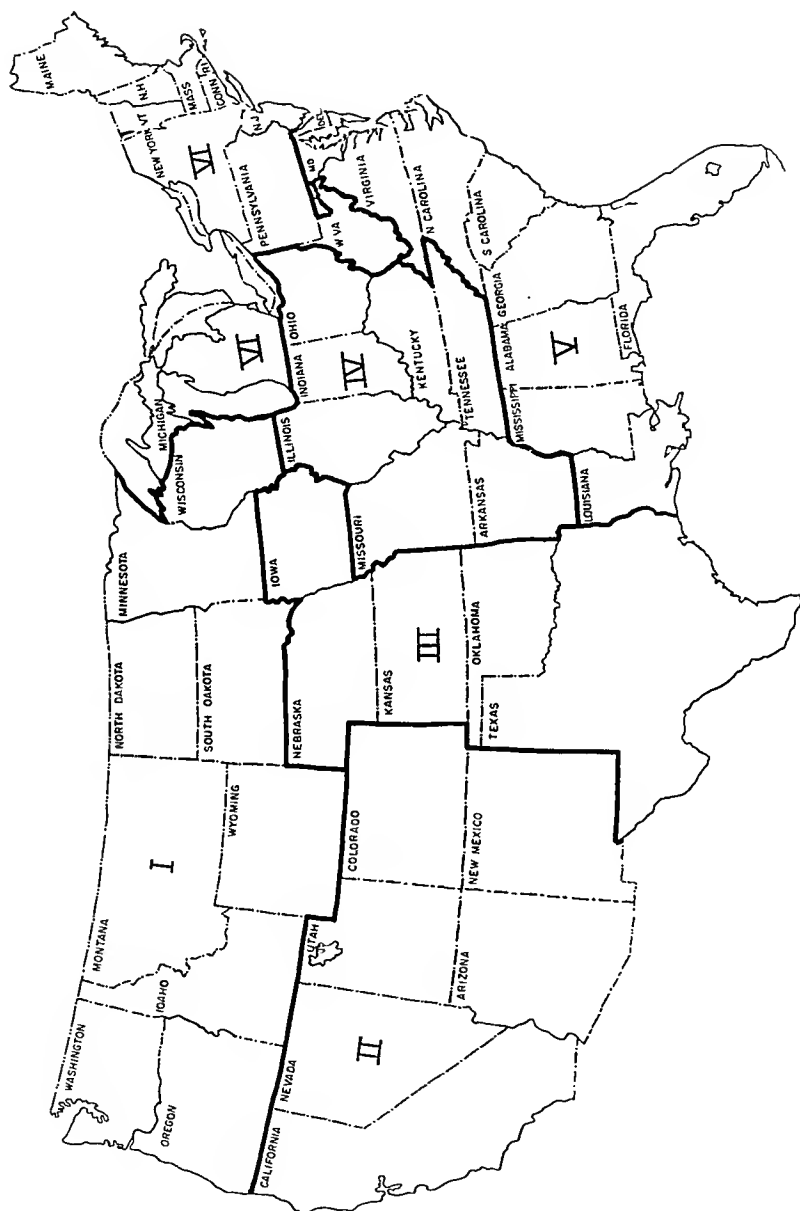
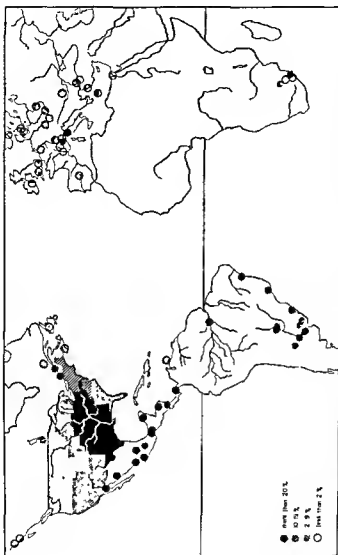


Figure 2. Geographic division of the United States which was used in this study.



Each study is indicated by a circle shaded to represent the percentage of positive reactors reported; "less than 2%" includes completely negative findings, areas from which no studies have been reported are unshaded (including the continents of Asia and Australia, which are not shown). Nationwide mapping of sensitivity is indicated for the USA.

—Reproduced from Mochi, A., and Edwards, P. Q.: Geographic distribution of histoplasmosis and histoplasmin sensitivity. *Bull. World Health Organ.* 5:259-291, 1952.

Figure 3. Geographic distribution of histoplasmin sensitivity throughout the world.

residence in Regions III and IV. Of 50 subjects from Region III, 22 per cent were histoplasmin positive, whereas of 257 from Region IV, the area of highest prevalence in most studies, only 17.1 per cent reacted.\* However, breakdown by age groups reveals that the median age of the subjects from Region IV was 4.1 years, whereas the median age for those from Region III was 5.8 years. As there were many more infants in the group from Region IV than Region III (60 as compared to 4), and as the frequency rate of histoplasmin sensitivity is a function of increasing age, the difference becomes more apparent. For children over 2 years of age the rates were 27.3 per cent for Region IV and 21.6 per cent for Region III, and there were no reactors in the combined total of 64 individuals from Regions III and IV below 2 years of age. Furcolow and associates<sup>15, 25</sup> showed that even in areas of high histoplasmin sensitivity, nonlifetime residents may show a higher rate of reaction than lifetime residents.

The number tested from Regions I and II was small, and the 15 per cent of reactors from Region II as compared to only 5.6 per cent from adjacent Region I may be related to age. The median age of the Region II group was greater—6.5 years as compared to 4.3 years for Region I. All three reactors from Region II were over 4½ years of age and all had spent over a year in Tennessee at the time of initial testing, while the only reactor from Region I had not spent any significant period in Region IV prior to testing. The possibility of cross reactions with other fungus diseases, especially coccidioidomycosis, was considered, because all three children from Region II had previously resided in California or Arizona where this disease is endemic,<sup>42</sup> but all three were negative to coccidioidin.

There were 35 children who had spent as much as 70 per cent of their lives in countries outside of the United States before coming to middle Tennessee. The only positive reactor to histoplasmin was a 3½-year-old child who had always lived in Germany before coming to this locality. Histoplasmin skin test 9 days after her arrival and 16 days after her entry into the United States was strongly positive. Twelve other children whose major residence was Germany failed to react.

Table 2 shows the considerable increase in histoplasmin sensitivity rate with increasing length of residence in Region IV, as well as with increasing age. The population studied was

\*As determined from five of the more extensive studies,<sup>16, 17, 22, 24, 42</sup> the order of rank of frequency of histoplasmin reactors of the states comprising Region III is: Kansas, 6th; Oklahoma, 10th; Texas, 14th; Iowa, 16th; and Nebraska, 20th. Region IV: Missouri, 1st; Kentucky, 2d; Tennessee, 3d; Indiana, 4th; Arkansas, 5th; Ohio, 8th; and Illinois, 9th.

TABLE 2  
 Histoplasmin Sensitivity, Initial Tests, For Age Groups, By Length Of Residence In USA  
 Region IV By Major Regions Of Residence

	Age, <2 Years			Age, 2 Years			Age, 2-5 Years			Total		
	Number Tested	Positive		Number Tested	Positive		Number Tested	Positive		Number Tested	Positive	
		No.	%		No.	%		No.	%		No.	%
Total	111	1	0.9	232	31	13.4	320	61	19.1	663	93	14.0
Residence in US Region IV												
<1 year	48	0	0.0	46	3	6.5	63	4	6.3	157	7	4.5
1 year	31	0	0.0	55	7	12.7	52	10	19.3	138	17	12.3
2 years	-----	---	---	70	13	18.6	133	35	26.3	203	48	23.6
No Record	32	1	3.1	61	8	13.1	72	12	16.7	165	21	12.7
Major Region of Residence												
USA, I-II	4	0	0.0	15	1	6.7	19	3	15.8	38	4	10.5
III	4	0	0.0	12	2	16.7	34	9	26.5	50	11	22.0
IV	60	0	0.0	97	17	17.5	100	27	27.0	257	44	17.1
V-VI	9	0	0.0	30	2	6.7	79	10	12.7	118	12	10.2
Foreign	2	0	0.0	17	1	5.9	16	0	0.0	35	1	2.9
No Record	32	1	3.1	61	8	13.1	72	12	16.7	165	21	12.7

relatively transient. Only 203 of the 498 for whom residence data was known had spent more than two years in Region IV, but their sensitivity rate was 23.6 per cent as compared with 4.5 per cent for those who had spent less than one year in this endemic area. Length of residence in Region IV did not become a factor, however, until the subject was two or more years of age; none of the 79 subjects less than two years old were positive reactors, even though they had resided in Region IV since birth. This is in contrast to the high rates of sensitivity in native infants reported from adjoining Williamson County.<sup>13</sup>

Table 3 further confirms the effect of the geographic residence of a subject on his likelihood of being sensitive to histoplasmin. Children whose major residence before moving to Region IV had been in Region III or Region V tended to have the highest rates of sensitivity during their first two years of residence in Region IV.

**Sex and Race.** There was no significant sex variation; 13.2 per cent of the 341 males and 14.9 per cent of the 322 females reacted to histoplasmin. Zeidberg, Dillon, and Gass<sup>13</sup> also found no sex difference, whereas Furcolow and associates,<sup>15, 25</sup> Emmons, Olson, and Eldridge,<sup>43</sup> and Prior, Wilce, and Palchanis<sup>44</sup> reported a predominance of male reactors. None of the 10 Negroes tested in this study were reactors. The number is too small to be significant, but the finding is in line with those of Zeidberg, Dillon, and Gass<sup>13</sup> and Furcolow, High, and Allen<sup>15</sup> who reported a lower percentage of reactors among Negroes.

**Comparison With Other Studies.** Potency of the antigen, testing technic, and interpretation of skin reactions affect testing results and make comparison of various studies difficult. In this study very rigid criteria for positive reactions were used, and any borderline cases are omitted from the analysis. Another factor of vital importance that was ensured in this study is elimination of contamination of glassware and needles with tuberculin. The importance of those factors in a comparison of sensitivity rates is obvious, but they cannot be readily assessed. It is believed, however, that the difference in reaction rates between other studies of middle Tennessee children<sup>13, 22</sup> and the present one is related primarily to the previous site of residence of our subjects. We found that children who have previously resided in areas where histoplasmosis is uncommon are less likely to exhibit histoplasmin sensitivity when tested soon after arrival in an endemic area than are natives of the area.

**Roentgenographic Pulmonary Findings.** The relationship of pulmonary calcification to histoplasmin sensitivity has been demonstrated repeatedly, and no attempt was made to analyze



TABLE 3. HISTOPLASMIN SENSITIVITY BY LENGTH OF RESIDENCE IN VARIOUS REGIONS

Major Region of Residence	Length of Residence in Region IV									
	< 1 Year			1 to 2 Years			< 2 Years			
	No. Tested	No. Pos.	% Pos.	No. Tested	No. Pos.	% Pos.	No. Tested	No. Pos.	% Pos.	
I	15	1	6.7	3	0	0	0	-	-	
II	7	0	0	12	3	25.0	1	0	0	
III	25	3	12.0	18	5	27.8	7	3	42.9	
V	46	2	4.3	29	3	10.3	16	5	31.2	
VI	14	0	0	6	2	33.3	7	0	0	

the correlation in this study, although a roentgenogram of the chest was obtained on all positive reactors to either histoplasmin or tuberculin. All types of roentgenographic findings due to histoplasmosis, ranging from mediastinal lymphadenopathy through frank pneumonic infiltrations, both minimal and massive, to the "stippled lung" of miliary calcification, were observed. The findings were in agreement with the results of others that, in this area, pulmonary calcification is much more commonly associated with sensitivity to histoplasmin than with sensitivity to tuberculin.<sup>13, 20, 22, 39, 40, 45, 46</sup> Acquisition of histoplasmin sensitivity can occur at an early age<sup>13, 47</sup> but pulmonary calcification due to histoplasmosis is rare in early life and increases with advancing age. However, Peterson and Christie<sup>40</sup> observed the development of pulmonary calcification in a 4½-month-old infant dying with histoplasmosis. A young child observed in the present investigation exhibited calcification 4½ months after inception of a serologically proven Histoplasma infection.

**Cross Reactions.** It has been demonstrated that cross reactions between histoplasmin and other fungus antigens can occur, but need not be a problem.<sup>42, 43, 48, 49</sup> *Candida albicans* is a relatively common cause of oral infection in infants, and if this fungus infection were significant in producing cross reactions a large number of infants would be expected to react to histoplasmin; however, in this study as well as in others,<sup>15, 22</sup> infants have shown an extremely low reaction rate. It has been conclusively shown that no cross reactivity between histoplasmin and tuberculin exists.<sup>50</sup>

In this study, two histoplasmin-positive children who had spent the majority of their lives in Region II, which includes California, an endemic area for coccidioidomycosis, failed to react to coccidioidin. One histoplasmin-negative child who had spent 95 per cent of her life in California was also negative to coccidioidin. This numerically scanty evidence corroborates the findings of other studies<sup>21, 22, 25, 46, 48, 51</sup> that cross reactions, while they occasionally occur, are of no real importance in the interpretation of histoplasmin sensitivity in the central part of this country.

**Epidemiological Aspects.** Present concepts of histoplasmosis have resulted from a critical examination of disease processes that were formerly considered to be almost exclusively of tuberculous origin. Up to 1945 histoplasmosis had been considered a rare and invariably fatal disease. At that time the investigations of Christie and Peterson<sup>10, 11</sup> clearly proved the existence of a widespread mild infection. The pattern of age response is such as one would expect from a widely disseminated infectious

agent. The age at which sensitivity is acquired, the relative absence in young infants, and the progressive rise in prevalence of sensitivity with increasing age indicate that histoplasmosis is not a household contagion but is related to broader and less localized factors.

Additional evidence against person-to-person transmission lies in the results of family studies. In the present investigation all siblings of 123 families with more than one child were tested. Of 71 families with 2 siblings, both siblings were histoplasmin positive in only 5 instances; in no instance did all siblings of families with 3 children show positive reactions. Although there was a slightly greater chance for the older sibling to react to histoplasmin, there was no concentration of reactors in some families and of nonreactors in other families. This is similar to the result obtained in intrafamily studies in Kansas City, Mo., by Fereboog and Furcolow.<sup>22</sup> The reported cases<sup>23, 24</sup> of systemic histoplasmosis in siblings and persons in close contact are probably due to exposure to a common source, as postulated by Beadenkopf and Loosli,<sup>25</sup> rather than to person-to-person transmission.

Although many species of animals have been shown to harbor the fungus, there is no substantial evidence of transmission from animal to animal or animal to man.<sup>26-28</sup> The organism has been isolated from the soil in many areas of the United States,<sup>29, 30</sup> including the soil and river water in adjoining Williamson County, Tenn.<sup>30, 31</sup> Residents of a damp environment are more likely to be reactors than those from dry environments,<sup>32, 33</sup> dampness apparently being an *in vitro* growth requirement for *H. capsulatum*.<sup>34</sup> Higher sensitivity rates have been observed in rural than in urban residents.<sup>35, 36</sup> Zeidberg, Dillon, and Cass<sup>37</sup> reported a rise of histoplasmin sensitivity in the summer and early fall, but no significant seasonal change was noted in the current investigation: January-March, 14.5 per cent; April-June, 13.9 per cent; July-September, 13.1 per cent; and October-December, 15.4 per cent.

In the past several years, many epidemics of pulmonary disease of obscure etiology were reported<sup>38-40</sup> but more recently evidence has been presented that the etiologic agent was *H. capsulatum*.<sup>41-43, 44</sup> In most cases there was a history of exposure to dust contaminated with excreta from pigeons, chickens, or bats, which probably contributed factors favorable for the growth of the organism. Ibach, Larsh, and Furcolow<sup>41, 42</sup> isolated the organism from the air of unused chicken houses in Kansas and Missouri, where several individuals engaged in cleaning these houses had developed acute pulmonary histoplasmosis.

Figure 1 illustrates the proximity to a creek and river of the Air Force base where the present investigation was conducted. Eighty-eight per cent of the children tested resided in the housing project, as did 89 per cent of the histoplasmin reactors. The center of the housing project was 5,300 feet from the river and 1,600 feet from the creek, and there were no bodies of water within the project. By criteria of Zeidberg and associates<sup>71</sup> this would be considered a "dry" environment, and a large majority of the total group tested were infants and young children, so that it is unlikely that their range of activity would extend to either the creek or the river. However the soil at the housing project is shallow, slightly acid, and of low permeability and organic content. This is the same as the type I soil of neighboring Williamson County, from which *H. capsulatum* has been isolated repeatedly.<sup>70, 71</sup> In addition to soil similarities there is very little difference in the geographic and climatologic characteristics of Williamson and Rutherford Counties; elevation and average annual temperature and rainfall are essentially the same\*

#### RESULTS AND DISCUSSION; TUBERCULOSIS

Although the primary concern of this investigation was with histoplasmosis, the findings related to tuberculin sensitivity are of interest because they reconfirmed the absence of any regionalization of high tuberculin reaction rates to the populace of the lower Mississippi River Basin where the prevalence of pulmonary calcification is greatest. Table 4 reveals that only 17 (2.6 per cent) of the 663 subjects reacted to tuberculin. This contrasts sharply with the 14.0 per cent histoplasmin rate. There was a sex difference in that 12 of 341 males as compared to 5 of 322 females reacted to tuberculin, and prevalence increased with age. The percentage of reactors (2.3 per cent) in the age group below 5 years was identical with that in the age group from 5 to 10 years, but the rate increased to 5.2 per cent in the small number tested who were over 10 years of age.

Table 5 compares the results with those of three previous studies of native Tennessee children. It can be seen that there has been a progressive decrease in the prevalence of tuberculin sensitivity in Tennessee children in recent years, reflecting the marked success of case-finding methods and advances in management of the clinical disease.<sup>53, 54</sup> Although many surveys of tuberculin sensitivity in native children of different areas have been reported,<sup>53, 55-58</sup> no report could be found concerning this problem in a heterogeneous group of children who had lived in all parts of the United States. The high rates in natives of Regions I and II (table 4) can be partly explained on the basis

\*Climatological Data, Tenn., Vol. 57, No. 13, U. S. Dept. of Commerce.

of the small number of subjects available for testing from these regions and the fact that two of four reactors from Region I were siblings.

TABLE 4  
TUBERCULIN SENSITIVITY, INITIAL TESTS

Classification	Number Tested	Tuberculin Positive	
		No.	%
Total	663	17	2.6
Sex			
Male	341	12	3.5
Female	322	5	1.6
Age			
<1 year	28	1	3.6
1 year	83	2	2.4
2 years	232	5	2.2
5 years	262	6	2.3
>10 years	58	3	5.2
			2.3
			2.8
Residence in Region IV			
<1 year	157	5	3.2
1 year	138	5	3.6
2 years	78	0	0.0
3 years	49	0	0.0
4 years	26	0	0.0
>5 years	50	1	
No Record	165	6	3.6
Major Region of Residence			
USA I	18	2	11.1
II	20	4	20.0
III	50	1	2.0
IV	257	2	0.8
V	91	1	1.1
VI	27	0	0.0
Foreign	35	1	2.9
No Record	165	6	3.6

Sixteen of the 17 tuberculin reactors were studied for signs of disease. By the usual criteria,<sup>20</sup> six children were considered to have healed or inactive primary pulmonary tuberculosis, and six had active pulmonary tuberculosis which healed without complications. Two children had tuberculous cervical lymphadenitis

TABLE 5.  
TUBERCULIN SENSITIVITY IN CHILDREN RESIDING IN TENNESSEE

AUTHOR	YEAR		% Positive Reactions In Each Age Group			
			0-5	5-10	10-15	15-20
ARONSON <sup>90</sup>	1933	Rural Tenn. Children	—	36.8	60.8	67.4
GASS <sup>7</sup>	1938	Rural Tenn. Children	—	—	49.0	48.8
CHRISTIE <sup>22</sup> & PETERSON	1946	Middle Tenn. Children	3.1	12.6	24.9	—
CURRENT STUDY	1952-3	Children From All Parts Of U.S. Currently Residing In Tenn.	2.3	2.3	5.2	—

that was cured by surgical and antibiotic therapy. One child with progressive primary pulmonary disease recovered on bed rest and antimicrobial therapy. A 2½-year-old boy was found to have very early tuberculous meningitis; he has remained entirely normal for 30 months after completion of treatment.

### SUMMARY

A group of 663 children who had resided in all parts of the United States and abroad and were now living in middle Tennessee were tested for skin sensitivity to histoplasmin and to tuberculin. Of the 663 initially tested, 93 (14 per cent) reacted to histoplasmin and 17 (2.6 per cent) to tuberculin. Only 4 (0.6 per cent) reacted to both antigens. Ten cases of active tuberculosis, including one of early tuberculous meningitis, were discovered by means of this study.

Sensitivity to histoplasmin was rare in infancy and rose with increasing age. There were no sex or seasonal differences. Children who had spent the majority of their lives in states bordering the mid-portions of the Mississippi and Ohio Rivers exhibited the greatest incidence of histoplasmin sensitivity. The likelihood of a positive reaction also increased with duration of residence in this area (middle Tennessee). The sensitivity rates found in this investigation were lower than those reported by others for native children in the east central United States because of the rigid techniques of testing and interpretation employed and the fact that many of the subjects had resided mainly in areas where less opportunity for exposure to the infecting organism existed. The findings in this study confirm reports of others that in the central portion of the United States histoplasmosis is a more common cause of pulmonary calcification than is tuberculosis. The results of family studies are evidence against person-to-person transmission of the infection.

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## DIET AND ATHEROSCLEROSIS

"The ingestion over the years of a diet rich in cholesterol-lipid is an *essential prerequisite* for the development of significant atherosclerosis in a population group. Such a diet may be regarded as an essential 'trigger' for the atherogenic process (viewed as a group phenomenon). Once the trigger is pulled (i. e., once the prerequisite diet is ingested), individual differences—endogenous factors (hereditary, constitutional, etc.)—come into play to influence whether the charge is fired (i. e., whether the given person develops significant atherosclerosis)."

—LOUIS N. KATZ, M. D.  
in *Annals of Internal Medicine*  
p. 933, Nov. 1955

# CHARACTERISTICS AND TREATMENT OF MILIARY TUBERCULOSIS

STEPHEN J. BERTÉ, *Lieutenant Colonel, MC, USA*

**I**N DISCUSSING the pathogenesis of tuberculosis, the difference between the childhood (primary) and adult (reinfection) types of tuberculosis always arises. This, in effect, is the difference between tuberculosis in the tuberculin-negative person and tuberculosis in the tuberculin-positive person. The basis of this difference is the presence or absence of allergy and immunity.

What is allergy and immunity in tuberculosis? In general, the presence of allergy is recognized when a positive tuberculin skin test is observed. Immunity is the acquired or inherent ability of the host to maintain the disease within certain boundaries and to reduce dissemination. It has been observed that the initial cellular response to infection differs in tuberculin-negative and tuberculin-positive patients. Pleural effusion due to tuberculosis does not occur until tuberculin allergy is demonstrated clinically. The early cellular response within the lung of the previously uninfected host is a lobular pneumonia with no tendency to wall off the lesion with a fibrous capsule. Macrophages engulf *Mycobacteria tuberculosis* and transport them to the regional lymph nodes via the lymphatic vessels. In the previously infected host there is a more immediate proliferative response. Macrophages undergo lysis and there is little transportation of organisms via the lymphatics. Necrosis, epithelioid cell proliferation, and fibroblastic response occur earlier and tend to delimit the caseous tubercle within local boundaries. On the one hand, it is theorized that the presence of tuberculin allergy is responsible for pleural effusion, lysis of phagocytes, necrosis, and rapid delimitation of the tubercle. However, some authors suggest that allergy is an incidental factor and that acquired immunity dictates the type of cellular response in tuberculosis. In reinfection tuberculosis, both allergy and immunity are usually present. For the present it is probably wiser to assume that both may contribute in some way to the altered tissue response.

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Summary of a lecture given before the Eighth Annual Symposium on Pulmonary Diseases at Fitzsimons Army Hospital, September 1955.

From Fitzsimons Army Hospital, Denver, Colo. Col. Berté is now assigned to Valley Forge Army Hospital, Phoenixville, Pa.

## DISSEMINATION OF TUBERCULOSIS

Theories of dissemination of tuberculosis are based on animal experiments, clinical observations, pathologic examinations, and the anatomic similarity of the lymphatic drainage of the lung in man and the guinea pig. Starting with a droplet infection in the lung, the sequence of evidence that follows may be summarized in the following outline form:<sup>\*</sup>

## I. Primary infection in the tuberculin-negative patient

## A. When bacilli in a droplet come to rest in a more central portion of the lung:

1. A lobular pneumonia develops.
2. Macrophages engulf bacilli and carry them to hilar and mediastinal nodes via the deep lymphatics.
3. As the pneumonic process enlarges, central caseation may become evident. At the time of caseation there is a lysis of phagocytic cells and infecting organisms. Giant cell formation occurs which, in all probability, is a response to a "foreign body" composed of necrotic cellular debris.

## B. Prognosis of an initial infection in a more central portion of the lung drained by the deep lymphatics:

1. Complete resolution leaving a small fibrous residual, or resolution with the development of a Ranke complex.
2. Local progression to an extensive pneumonic process, plus enlargement of hilar and mediastinal nodes.
3. The infection may be maintained within local boundaries and possess viable bacilli within a necrotic focus for months or years. This latent infection may be the cause of subsequent endogenous reinfection.

## C. When bacilli in a droplet come to rest in a subpleural location:

1. A pathologic process develops similar to that described in the more centrally located lesions.
2. Few tubercles develop on the surface of the pleura and there is little pleural reaction and no effusion.
3. Bacilli are transported via the superficial lymphatics of the lung to the parasternal and para-aortic nodes.<sup>1</sup> It is remotely possible for organisms to be carried by the superficial lymphatics around the periphery of the lung to the hilum.

## D. The prognosis of an initial infection in a subpleural location is basically similar to the more centrally placed lesions with the following exceptions:

1. The lymphatic drainage of infecting organisms is different in that there is no direct communication between the deep and superficial lymphatics of the lung.

<sup>\*</sup>The greater portion of information in the subsequent outline was obtained from publications by Burke<sup>1</sup> and Medlar.<sup>2</sup>

2. Unresolved tuberculous disease may progress and produce pleural effusion with numerous tubercle formations and pleural adhesions. This occurs within two to six weeks at about the time the patient develops a hypersensitivity to tuberculo-protein.

## II. Infection in the tuberculin-positive patient

- A. The sequence of events after infection occurs in the following chronologic order:

1. A small area of lobular pneumonia occurs.
2. Caseous necrosis develops with the typical pathologic picture of tuberculosis.
3. Liquefaction of caseous contents of the tubercle may occur.
4. The liquefied contents of the tubercle may then be sloughed into the lumen of a communicating bronchus and cause new tuberculous disease in other areas of the lung.

- B. Prognosis of the pathologic lesion in the tuberculin-positive patient:

1. In the highly immune person the small area of lobular pneumonia may completely resolve, leaving no residual, or may heal by simple fibrosis.
2. Once caseous necrosis develops, the lesion may remain latent for a long time and eventually heal by fibrosis or it may become liquefied.
3. Once liquefaction develops, sloughing of the lesion into a bronchus nearly always occurs. It is difficult for the body to dispose of a foreign body in the form of inspissated liquid contents of a tuberculous lesion by any other means than sloughing it into a bronchus.

Miliary tuberculosis of the lungs and meninges is the result of hematogenous dissemination of *Myco. tuberculosis*. Following a tuberculous infection in the body, bacilli may enter the blood stream by any of the following routes:

1. A caseous focus may rupture into a pulmonary vein with dissemination via the left auricle and ventricle.

2. Mediastinal, parastinal, or para-aortic nodes may rupture into the venous system or spread into the venous system by way of the thoracic duct and be disseminated via the right auricle and ventricle. A greater proportion of bacilli in the tuberculin-negative patient, and a smaller proportion in the tuberculin-positive patient, may be carried through the pulmonary circulation and be disseminated through the systemic circulation. (Animal experiments suggest that most of the organisms transported to the lungs by the blood are detained in the lung by some yet not understood immune mechanism in the previously immunized ani-  
mal.)

3. A secondary, tuberculous, caseous focus in some other organ such as the prostate may rupture into a vein and be carried to the pulmonary circulation.

4. In general, the extent and location of disease following hematogenous dissemination depends upon the number of bacilli disseminated and the immunity of the host.

### ROENTGENOGRAPHIC PICTURE

A roentgenogram of the chest revealing diffuse, bilateral, fine miliary shadows is essential to the diagnosis of miliary tuberculosis, which is characterized by miliary "seeding" in both lungs (figs. 1, 2, and 4); however, a diagnosis of miliary tuberculosis should not be accepted simply on the basis of a typical chest roentgenogram. Great caution should be practiced, because there are over 80 primary pulmonary and systemic diseases with pulmonary manifestations that may produce diffuse miliary shadows on the x-ray film. The diagnosis of miliary tuberculosis is suspected from the roentgenogram (figs. 1-4), definitely proved by the isolation of *Mycobacterium tuberculosis*, and (in the absence of positive bacteriologic findings) is presumptively proved by clinically eliminating other possibilities and observing the response to a course of specific chemotherapy.

### SIGNS AND SYMPTOMS

There is a great variation in the signs and symptoms. I have seen patients who denied all symptoms and had been brought to the hospital only because a routine roentgenogram had revealed diffuse, miliary shadows in both lungs. At the other extreme, a patient with proven miliary tuberculosis with meningitis was recently admitted to this hospital in profound coma. Despite this variation, the majority of patients admitted to hospitals are well oriented but appear ill and demonstrate chills, fever, anorexia, and malaise. Occasionally the presenting clinical picture may be "flu-like" or "typhoid-like." Rarely, jaundice is seen with involvement of the liver or in association with secondary hemolytic anemia. An analysis of patients with miliary tuberculosis at this hospital within the past three years revealed that (1) 48 per cent complained of cough; (2) 64 per cent exhibited auscultatory findings in the lungs, and of these findings, 80 per cent consisted of bilateral, inspiratory rales; and (3) extrapulmonary tuberculosis was detected in 92 per cent of cases, and of these, 52 per cent consisted of tuberculous meningitis as a coexistent form of extrapulmonary tuberculosis.

### LABORATORY EXAMINATIONS

The complete "routine" blood cell count and sedimentation rate is of no diagnostic aid. The blood count may be of aid in



*Figure 1. Extremely fine, diffuse miliary nodulations seen in the lung of a patient with miliary pulmonary and meningeal tuberculosis.*

suspecting a secondary anemia, hemolytic anemia, or a pancytopenia with extensive bone marrow tuberculosis.

A positive tuberculin skin test adds great support to the diagnosis before the specific micro-organism is isolated. However, a negative tuberculin skin test may be found under the following conditions:

1. In a first infection with early hematogenous dissemination.
2. Tuberculin anergy may occur in the severely ill person.
3. Allergy to tuberculoprotein may be lost many years after an original infection and may not reappear until a short time after reinfection tuberculosis is well established.
4. Improperly prepared or administered tuberculin may give a false negative test.

Serologic studies for such fungal diseases as histoplasmosis, coccidioidomycosis, and blastomycosis are available and should



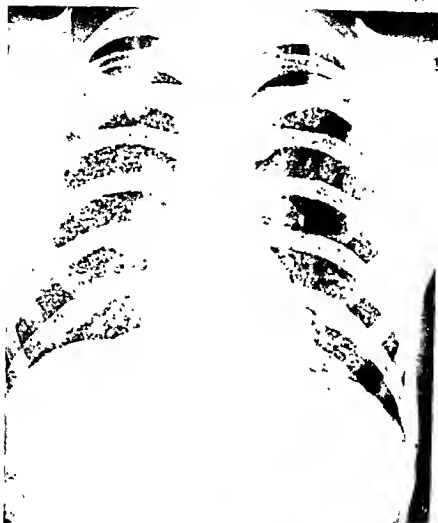


Figure 2. Moderately coarse, diffuse, miliary nodulations are present. The patient received 28 months of combined drug therapy.

be obtained. These latter diseases may completely mimic the clinical and roentgenographic picture of miliary tuberculosis.

Various body fluids that should routinely be examined for the presence of *Myco. tuberculosis* are:

1. Sputum—concentrated smear and culture.
2. Gastric fluids—culture. (Examination by direct smear may add confusion to the diagnosis because of the frequent finding of nonpathogenic acid-fast bacilli.)
3. Urine—concentrated smear and culture of a 24-hour specimen.

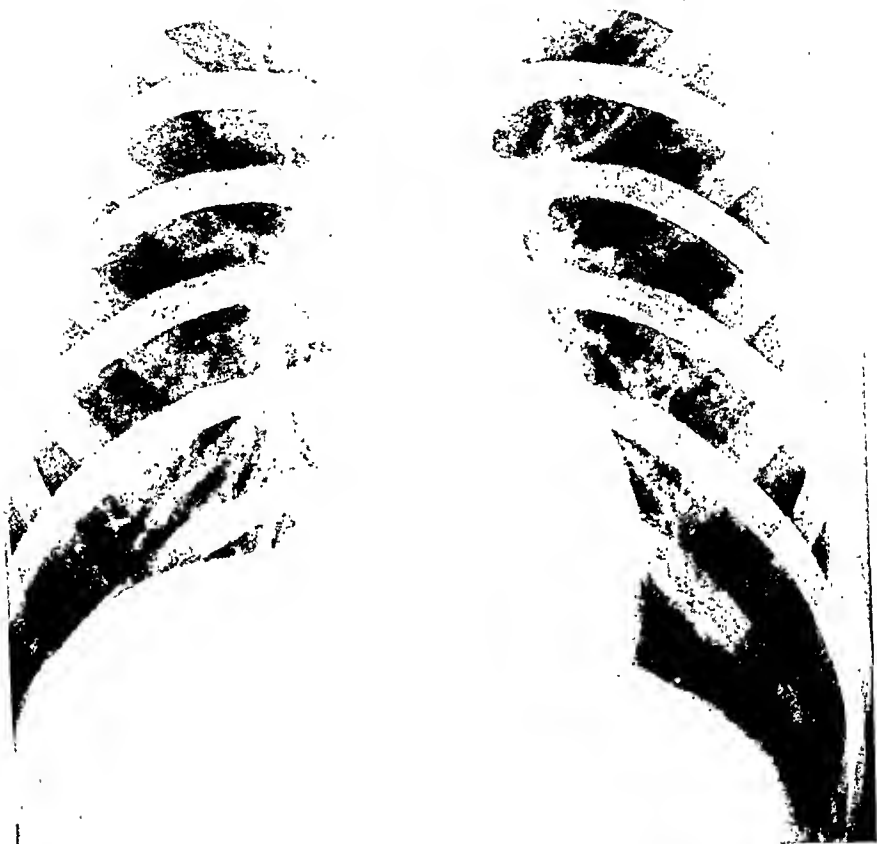


Figure 3. Same patient as in figure 2 after the roentgenographic findings returned to normal. Miliary nodulations had disappeared after four months of chemotherapy.

4. Cerebrospinal fluid—smear and culture. (The finding of acid-fast staining bacilli in the protein pedicle of spinal fluid may be accepted as proof of tuberculous meningitis. The chance finding of acid-fast staining organisms, other than *Myco. tuberculosis*, in this location is quite unlikely.)

Cultures for *Myco. tuberculosis* are preferred to guinea pig inoculation when highly qualified laboratory personnel are available. However, guinea pig inoculation of suspected material may be preferred when the laboratory is not equipped to do a detailed research type of analysis of micro-organisms.

Some authors,<sup>3-7</sup> have obtained gratifying results in the diagnosis and treatment of miliary tuberculosis with the aid of bone marrow and liver biopsies. This practice has not been evaluated at this hospital.

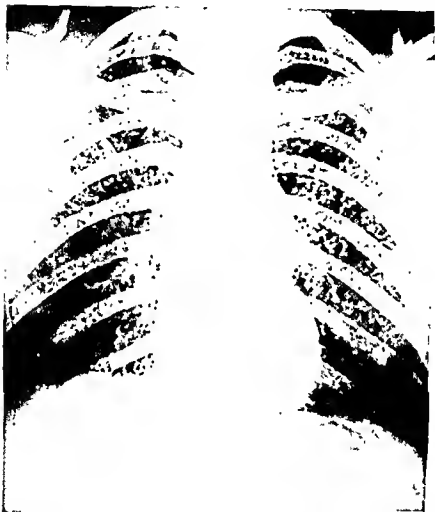


Figure 4. Coarse, conglomerate, miliary nodulations with numerous circular densities or "pseudocavities" in the lung of a patient with miliary pulmonary tuberculosis.

A review of cases at this hospital indicates that, of patients with miliary tuberculosis admitted within the last three years, 61 per cent of cases were proved by bacteriologic means. The remainder were diagnosed presumptively by excluding other possible diagnoses and observing a typical response to antituberculous chemotherapy.

## PATHOLOGY

The pulmonary lesions of miliary tuberculosis are produced when many bacteria are disseminated via the pulmonary artery and are lodged at multiple sites throughout the lung parenchyma. As a result, many minute areas of lobular pneumonia are produced. These areas then form a noncaseating tubercle which heals by complete fibrosis under the influence of chemotherapy. Occasionally this healing process can result in diffuse pulmonary fibrosis with some degree of alveolar-capillary block to the diffusion of gases. Medlar described an occasional form of miliary tuberculosis called "acute caseating miliary tuberculosis" in which caseation is a prominent component of each miliary tubercle. Such a condition may be associated with an untreated, overwhelming infection in which many bacilli are deposited at each site. A high tuberculin sensitivity and, perhaps, a temporary reduction in immunity may be contributing factors.

## TREATMENT

Miliary tuberculosis was virtually 100 per cent fatal before the advent of specific chemotherapy. "Healed" calcified miliary tuberculosis has been described, but this, in all probability, represents miliary calcifications of histoplasmosis or aspergillosis.

An understanding of the treatment of miliary tuberculosis can best be appreciated by reviewing the "evolution" of chemotherapy since 1946. At first, streptomycin sulfate (SM) was administered alone for short periods of time. Smith<sup>8</sup> reviewed one hundred cases treated daily with SM for two and one-half to four and one-half months. The survival two and one-half years after treatment was miliary tuberculosis alone, 47 per cent; miliary tuberculosis with meningitis, 3 per cent; and meningitis alone, 16 per cent. Other reports<sup>9,10</sup> revealed similar survival data with variations of plus or minus 5 per cent.

Des Autels and Pfuete<sup>10</sup> found the increase in survival when the daily dose of SM was combined with para-aminosalicylic acid (PAS) for a period of at least 12 months, as follows: miliary tuberculosis alone, 83.3 per cent; miliary tuberculosis with meningitis, 71.4 per cent; and meningitis alone, 59.3 per cent. Debre<sup>11</sup> reviewed the results in 170 children with miliary and meningeal tuberculosis treated for from 8 to 13 months and found similar survival rates following a five-year follow-up period.

At the Thirteenth Veterans Administration-Army-Navy Conference on the Chemotherapy of Tuberculosis<sup>12</sup> at St. Louis, Mo., in February 1954, the great significance of isoniazid (isonicotinic acid hydrazide, INH) in the treatment of miliary tuberculosis was emphasized. In a review of several hundred cases it

was shown that 40 per cent of patients with military tuberculosis treated with SM alone developed meningitis within one year of the beginning of therapy. In patients treated with SM and PAS, only 14 per cent developed meningitis within one year. When INH was combined with SM and PAS, no patients developed meningitis during a six months' follow-up period. The over-all survival in military tuberculosis with meningitis was twice as great in SM-PAS-INH treated cases as in SM-PAS treated cases in a 6- to 18-month follow-up study.

Data extracted from the consolidated tables of the Fourteenth Veterans Administration-Army-Navy Conference on the Chemotherapy of Tuberculosis<sup>13</sup> given at Atlanta, Ga., February 1955, summarized the results of chemotherapy to date. Table 1 illustrates this in a review of 728 cases (140 of which were treated with INH).

TABLE 1

Type of tuberculosis	Drug regimen	Per cent of survival after 18 months
Military alone	SM	64
	SM-PAS	81
	SM-INH, or SM-INH-PAS	95
Military with meningitis	SM	16
	SM-PAS	41
	SM-INH, or SM-INH-PAS	80
Meningitis alone	SM	25
	SM-PAS	52
	SM-INH, or SM-INH-PAS	78

(Note: In the SM- and SM-PAS-treated groups above, survival at 18 months was similar to survival data at five years.)

At this hospital, triple drug therapy using SM-INH-PAS gave the best results in military tuberculosis. Roentgenograms of patients treated with SM-INH-PAS showed clearing of military shadows in an average of 6.8 months (fig. 3). Roentgenograms of patients treated with varying combinations of SM, PAS, and viomycin sulfate showed clearing of military shadows in an average of 10.6 months. No relapses occurred in patients with military tuberculosis treated for at least 18 months. Relapses occurred in patients with tuberculous meningitis treated for less than 2 years.

The treatment of military tuberculosis with INH alone has been under investigation. The theory of such treatment is based upon the character of the minute, noncaseating granuloma. It is thought

that INH can penetrate this lesion, eliminate all multiplying organisms, and promote complete healing. The drug is continued for a long time because some nonmultiplying, intracellular organisms may maintain their viability and institute regrowth with early discontinuance of chemotherapy. For the present, it must be assumed that INH alone is not proved to be equal to the combined chemotherapeutic methods.

### RECOMMENDED DRUG THERAPY

Upon the basis of the foregoing observation, the following recommendations regarding drugs are made in connection with the treatment of miliary pulmonary and meningeal tuberculosis:

1. Use triple drug therapy consisting of SM-INH-PAS:
  - a. Give 1 gram of SM daily, for a three-month period. If a decided response has been observed, SM may then be continued in doses of 1 gram every third day.
  - b. Give INH in a dosage of 10 to 16 milligrams per kilogram of body weight per day. (Pyridoxine, 100 milligrams daily, should be administered with INH to reduce neurologic complications.)
  - c. Give PAS in a dosage of 12 grams daily divided into three or four portions.

2. When the patient is in coma or is vomiting, INH may be given in the same dosage by intramuscular injection and PAS can be given intravenously, using 15 grams of the lyophilized crystals.

3. Drug therapy should be continued for at least 18 months in miliary tuberculosis without meningitis and at least 24 months in tuberculous meningitis. The roentgenographic findings or spinal fluid chemical studies should have been relatively normal for more than six months before chemotherapy is discontinued. At this hospital, we have recommended for prophylaxis at least 24 months of chemotherapy for miliary tuberculosis without meningitis and at least 30 months of chemotherapy for tuberculous meningitis. A few patients with meningitis with more severe manifestations have received three years of chemotherapy. Isoniazid may be reduced to about 5 milligrams per kilogram of body weight per day when the patient is allowed to go home. Such a reduction in the dosage of INH should probably not be considered until at least 18 months of chemotherapy have been completed.

4. SM intrathecally is not recommended in tuberculous meningitis; and, although we have not used cortisone and corticotropin at this hospital, recent reports<sup>14,15</sup> suggest that their early trial may warrant consideration.

## SUMMARY

Miliary tuberculosis is the result of hematogenous dissemination of *Mycobacteria tuberculosis*. Roentgenograms of the chest reveal small diffuse nodulations in all areas of both lungs. The infecting organism enters the venous circulation via the thoracic duct, rupture of a caseous lymph node into an adjacent vein, or from a distant source such as the prostate. There are differences in the dissemination of *Myco. tuberculosis* in primary and reinfection tuberculosis. In the initially infected host, bacilli are transported more rapidly to the regional lymph nodes via the deep and superficial lymphatics of the lung. The majority of disseminated organisms in initial infections in tuberculin-negative hosts pass through the pulmonary circulation and may lodge in the meninges or other organs. In reinfection tuberculosis, it is believed that most of the organisms are "trapped" in the lung and a much smaller per cent pass through to the systemic circulation.

Before the era of modern antituberculous chemotherapy, miliary tuberculosis, with or without meningeal tuberculosis, was virtually fatal, whereas present-day survival rates are 95 per cent in miliary pulmonary tuberculosis and about 80 per cent when tuberculous meningitis is present. Original drug therapy for miliary tuberculosis consisted of short courses of streptomycin sulfate (SM) alone. Later, SM was given for longer periods in combination with para-aminosalicylic acid (PAS). The best results are observed when isoniazid (isonicotinic acid hydrazide, INH) is added to SM and PAS, and all three are given for prolonged periods.

Presently recommended drug therapy is as follows: SM in a dose of 1 gram daily for three months, followed by 1 gram two or three times weekly; PAS in three or four divided doses totaling 12 grams daily; and INH in a dose of from 10 to 16 milligrams per kilogram of body weight per day. Pyridoxine (100 milligrams daily) should be administered with large amounts of INH to reduce neurologic complications. The total duration of chemotherapy should extend for 18 to 24 months in miliary tuberculosis alone, and for 24 to 30 months in tuberculous meningitis. Intrathecal therapy of any kind is not believed to be of any proven value.

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"On 1 January 1953, there were 13,342 physicians in the military services, and on 1 January 1955 there were 10,749. Just what do these 10,749 physicians do? First there are approximately 2,900,000 servicemen and then, in addition, about 2,200,000 dependents, and in various foreign countries 29,000 civilian employees with dependents who look to the military for care, which is a potential load of about 5,000,000 people to be cared for by doctors and dentists in the Armed Forces."

—FRANK B. BERRY, M. D.  
in *Journal of the Medical Association*  
of Georgia, p. 569, Dec. 1955



# THERAPY OF NONGONOCOCCAL URETHRITIS

## Comparison of Oral and Intramuscular Terramycin

FREDERICK S. WOLF, *Lieutenant Colonel, USAF (MC)*

MORTON J. THOSHINSKY, *Captain, USAF (MC)*

SANFORD CHODOSH, *Captain, USAF (MC)*

JOE O. ARRINGTON, Jr., *Captain, USAF (MC)*

**N**ONSPECIFIC or nongonococcal urethritis is a disease of young, sexually active males, and as such is of importance in the medical care of military personnel.<sup>1-4</sup> Its officially reported incidence in the military is small. The outpatient study, evaluation, and treatment of these cases is prolonged and expensive; the assurance of a "cure" cannot be optimistically given. In spite of a considerable amount of clinical research on this disease,<sup>5-11</sup> its etiology and epidemiology have yet to be definitely established; it is believed by most that its cause is related to bacterial or viral infection of the lower genito-urinary tract, and that it is transmitted from the female carrier to the male by sexual intercourse in much the same fashion as is assumed for some other infections.

Treatment with various antibiotics<sup>12-15</sup> has been partially successful, at least in relatively short-term follow-ups, and would seem to substantiate the belief that bacteria certainly play an important role, although, perhaps, do not explain the entire picture. It is a disease, however, that tends to recur even after initial success with antibiotic treatment. There is much dispute as to what antibiotic or combination of antibiotics is most efficacious in bringing about a cure, or at least a clinical remission. Terramycin (brand of oxytetracycline) in the intramuscular form was recently made available to us. The purpose of this study was to compare the clinical and bacteriologic results of treatment with this form of Terramycin with some other commonly used drugs.

## MATERIAL AND METHODS

Subjects consisted of personnel who appeared at the infirmary with a persistent urethral discharge negative for *gonococcus* on direct smear on three successive days, and negative for *Neisseria gonorrhoeae* on culture. At the time of the third smear, the urethral exudate was cultured; the organisms present were identified and routine sensitivity tests performed to penicillin, strepto-

From 1503d U. S. Air Force Infirmary, APO 226, San Francisco, Calif. Col. Wolf is now assigned to Air University, Maxwell Air Force Base, Ala.

mycin sulfate, Aureomycin (brand of chlortetracycline hydrochloride), Terramycin, and Chloromycetin (brand of chloramphenicol) by the disk method. After the above procedures were performed the patient was interviewed by a physician who took a history and performed a physical examination that included palpation of the prostate gland. Material was expressed by prostatic massage for smear, routine and *N. gonorrhoeae* culture, and routine sensitivity tests. All cultures were obtained by swab from the urethral meatus and transported to the laboratory in non-nutrient media that were later streaked out on both blood agar and chocolate agar plates under CO<sub>2</sub> tension. There were 57 patients included in this study.

Five different methods of treatment were prescribed, each assigned in rotation without regard to the organisms isolated or to their sensitivities, and regardless of the gross nature or severity of the discharge. The five treatment groups evolved were as follows:

1. *Control group.* These patients were given gelatin capsules containing sucrose and were instructed to take one every six hours for five days.

2. *Group on Terramycin intramuscularly.* These patients were given 100 mg of Terramycin as the crystalline hydrochloride, 100 mg of magnesium chloride hexahydrate, and 2 per cent (w/v) procaine hydrochloride in 2.1 ml of sterile water. This was injected into the gluteus muscle once daily for two days.

3. *Group on Terramycin orally.* This group was given 250 mg of Terramycin every six hours for five days.

4. *Group on penicillin.* This group was given 360 mg (600,000 units) of procaine penicillin G intramuscularly once daily for five days.

5. *Group on sulfadiazine.* This group was given 4 grams of sulfadiazine initially, then 1 gram every six hours for five days, and 2 grams of sodium bicarbonate every six hours.

In all instances the patients were given the following additional advice: (1) no sexual intercourse for one month, (2) no alcoholic beverages for one month, (3) no more than three cups of coffee per day, (4) no "milking down" of the urethra at any time, and (5) limited exercise.

Patients were seen one week after the start of therapy, at which time the clinical response was evaluated. A rectal examination was performed; the prostate gland was massaged, and any material expressed was again cultured and sensitivity tests performed; any urethral exudate was also cultured. Patients were seen again one month following the start of therapy, at which time the same procedures were performed.

## RESULTS

**Incubation Period.** We believe that no valid, clear-cut "incubation" period can be established for this disease, at least from our data and experience. It is true that in some cases a patient, previously free of symptoms, has a single sexual contact and several days later (often stated to be about 10 to 14 days) develops the symptoms of urothrits. However, because of this disease's variable nature and its tendency to recur after a quiescent period, a definite incubation period is difficult to establish. In many cases there have been multiple sexual contacts with the same or different women; other times the discharge appears to be a residuum of a successfully treated gonococcal urethritis. Frequently the patient has had symptoms intermittently or continuously for many weeks or months, varying with his physical activity, amount of fatigue, alcoholic intake, sexual activity, and various unknown factors.

Our incubation period, actually representing the period between the last contact and the appearance of symptoms and therefore not an incubation period in the bacteriologic sense, varied from 1 day to 2 months, and in 6 cases it could not definitely be established. Of our 57 cases, 10 occurred 4 days or less after contact, and 28 (about 50 per cent) occurred 5 to 15 days after the last contact. The median was 7 days, and the average was 11 days.

**Age and Race.** There were 41 white patients, 3 Negro, 3 Oriental, and 10 whose race was not recorded. These results seemed to reflect those of other investigators who have found a high prevalence of this disease among those of the Caucasian race, as opposed to gonorrhea, which seems to have a somewhat higher prevalence among those of the Negro race. The patients' ages varied from 19 to 39 years; the majority (33) were between 19 and 23 years inclusive, with the prevalence falling off rapidly after that. Our population, of course, was selective and only reflected the relatively young age of the personnel stationed at our base.

**Previous Venereal History.** Thirty-seven per cent of the patients had previously had gonorrhea; two patients had had four prior episodes and two others, three episodes. All had been adequately and successfully treated with penicillin. In a few cases the nonspecific urethritis seemed to be in some way related to this gonococcal infection in that their nonspecific discharge continued after their gonococcal urothrits had been cured. It is possible that both infections had been contracted at the same time, and the penicillin affected the gonococcus but not the other organisms. Another possibility is that the continued discharge may only represent an irritative factor or some phenomenon as yet poorly understood. In 53 per cent of our cases there had been one or more previous episodes of nonspecific urethral discharge, sometimes

lasting many months. Two patients had a history of chancroid, but none had had syphilis. Incidentally, primary syphilis was an extremely rare condition at our installation.<sup>3</sup>

**Precipitating and Aggravating Factors.** These are varied, and many are unknown. In many of our cases (60 per cent) there was a history of heavy alcoholic intake at the time of the last sexual exposure. This does not necessarily implicate alcohol as being a factor in acquiring the disease; however, in many patients alcohol seemed to reactivate a relatively inactive or latent case. Strenuous physical activity sometimes increased an already established discharge or made manifest an infection that had been in remission, and may account for the term "strain" used by many patients in association with this disease. Also, violent "milking down" of the urethra by overly concerned patients frequently prolonged the course of the disease.

**Prophylaxis.** Only 10 per cent of our patients used a condom, and this brings up the question of whether or not its more universal use would prevent nonspecific urethritis. (It has been our experience that the use of a condom definitely reduces the chances of contracting gonorrheal urethritis.) About 50 per cent of the patients stated that they washed and urinated within five minutes after intercourse; thus it would appear that this is not an effective method of control. No patients reported the use of intra-urethral medication or self-administered antibiotic medication.

**Symptoms.** The most prominent symptom of this disease, urethral discharge, was used as the major criterion for the evaluation of therapy. All of the patients had this symptom to a varying degree—from an intermittent, mild, clear, morning discharge to a continuous, more profuse, purulent discharge. In most cases the discharge was cloudy and milky in nature, occurring usually upon arising in the morning and after urinating. In many instances the discharge was grossly purulent, but rarely, if ever, was it as profuse as in most cases of gonorrhea, and rarely did it have the rather typical pale yellow color of the gonococcal urethral exudate. Many patients with nongonococcal urethritis were examined but were not included in this series because their discharge was so mild and intermittent that it offered little basis for later evaluation of therapy. Undoubtedly many of these had in reality a traumatic urethritis produced by excessive sexual activity or were over-anxious individuals who "milked down" the urethra; in other patients the discharge represented only a slight increase in the normal urethral mucus. In several other patients it cleared spontaneously during the process of obtaining preliminary smears; these, therefore, were not included in the series.

Burning on urination occurred in about 50 per cent of our patients and seemed to occur more often than with gonococcal

urethritis. An itching feeling inside the penis or glans was also frequently mentioned. Other symptoms mentioned rather infrequently were low back discomfort or pain; groin, testicular, or perineal discomfort; and frequency of urination. These latter symptoms more often seemed to be associated with the more apparent degrees of prostatic involvement.

**Physical Findings.** Aside from the urethral discharge, the external examination was usually negative for significant lesions. The most striking finding was prostatic involvement in about 70 per cent of our patients. This was usually manifested by an enlargement of from half to once again normal size, as well as by a definite boggy or spongy feeling distinctly different from that of the firm, normal, young male gland. Tenderness was infrequent, and when present it was usually mild. In nearly all of these patients several drops of cloudy fluid could easily be expressed on prostatic massage. In a very few patients the prostate was definitely tender and somewhat nodular, and these patients obviously had a well-developed prostatitis. Perhaps this disease should more correctly be called a "prostatic-urethritis." The prostatic involvement may explain the frequent difficulty in successfully treating this disease. We found no consistent correlation between the clinical results of treatment and change in the size and consistency of the prostate gland; in many patients with a clinical cure an enlarged, boggy prostate persisted, whereas in some with clinical failures the gland seemed to revert to normal. However, this aspect of our study was poorly controlled because we did not do prostatic examinations on a control group of normal individuals.

**Bacteriologic Data.** In table 1 are listed the various bacteria cultured from both urethral and prostatic exudates before and after treatment. There were 103 separate prostatic and urethral cultures before treatment and 37 after treatment. The lesser number after treatment reflects the fact that in the successful cases it was frequently impossible to obtain urethral and/or prostatic exudates.

It is seen that the hemolytic staphylococcus was by far the most commonly isolated organism, occurring in from about 70 to over 90 per cent of the cultures. The flora, however, was mixed in most cases, *Corynebacterium*, nonhemolytic staphylococcus, and streptococci also occurring frequently. It appeared that treatment had little effect on the type of flora or their relative abundance. Sterile exudates were so infrequent in our series as to be considered rare; it is doubtful that one can really sterilize the lower genitourinary tract. Our cultures, even though they showed little difference in flora before and after treatment, gave no index of the number of bacteria or their virulence—both important points to consider in any infection. Thus, the antibiotics could materially affect

the degree of infection and yet their activity not be reflected in our cultures. The fact that hemolytic staphylococcus, a known pathogenic organism, occurred so commonly, plus the fact that our results and those of other investigators have usually been superior with those antibiotics highly effective against hemolytic staphylococcus, would lead one to conclude that this organism must play some role in causing this disease.

Table 2 gives the results of the in vitro resistance studies of eight major isolated organisms. Of the five antibiotics tested, only penicillin and Terramycin were used in our study. It is evident that for hemolytic staphylococcus, penicillin is the most ineffective drug (37 per cent sensitive), and this is in agreement with most other observers. Streptomycin sulfate was 85 per cent effective and this perhaps explains recent reports of good results with combinations of penicillin and streptomycin sulfate. Hemolytic staphylococci were sensitive to Chloromycetin in almost 100 per cent of the cases, and perhaps on this basis this drug would deserve a more extensive trial in the treatment of this disease. Probably the reason for its infrequent use (and thus its effectiveness) reflects the medical profession's reluctance to use routinely a potentially toxic drug in a usually benign, self-limited disease subject to spontaneous remission. We have not hesitated to use it on occasions where all other drugs failed and the symptoms were fairly prominent, and we have frequently, though not uniformly, realized good results. Both Terramycin and Aureomycin seemed to be fairly active against hemolytic staphylococcus, much more so than penicillin but less so than streptomycin and Chloromycetin.

Aside from its poor activity against the hemolytic staphylococcus, penicillin appeared to be fairly active against other staphylococci and streptococci, and against *Streptococcus pyogenes* it continued to be superior to all others. Both Terramycin and Aureomycin, although not being the most potent drug with any one single organism, appeared to be highly effective against practically all of them.

An attempt was made to determine if there was any change in the sensitivities in the organisms after treatment (table 3). In the case of penicillin there appeared to be a decrease in the sensitivity of the organisms isolated after treatment. In the case of Terramycin and Aureomycin there was a decreased sensitivity with staphylococci; no increase in resistance to Chloromycetin was noted.

**Results of Therapy.** Table 4 summarizes the results of our series. A patient was considered cured if there was prompt clearing of the discharge or if it cleared within two weeks after the start of treatment and did not return. A patient was considered

TABLE 1. *Organisms isolated and frequency of their occurrence*

Organism	Cultures with organism			
	Before treatment		After treatment	
	No.	%	No.	%
Hemolytic staphylococcus				
Urethra	42	68.8	11	91.7
Prostate	39	92.8	20	80.0
Nonhemolytic staphylococcus				
Urethra	20	32.8	4	33.3
Prostate	9	21.4	9	36.0
Nonhemolytic streptococcus				
Urethra	7	11.5	3	25.0
Prostate	7	16.6	2	8.0
Streptococcus viridans				
Urethra	10	16.4	1	8.3
Prostate	9	21.4	2	8.0
Streptococcus pyogenes				
Urethra	3	4.9	1	8.3
Prostate	0	0	2	8.0
Corynebacterium				
Urethra	31	50.8	8	66.6
Prostate	22	52.2	15	60.0
Micrococcus				
Urethra	2	3.3	0	0
Prostate	2	4.7	0	0
Hemophilus influenzae				
Urethra	5	8.2	0	0
Prostate	2	4.7	0	0
Bacterium alkaligenes				
Urethra	1	1.6	1	8.3
Prostate	2	4.7	1	4.0
Bacillus subtilis				
Urethra	5	8.2	0	0
Prostate	0	0	2	8.0
Paracolobacterium aerogenoides				
Urethra	1	1.6	0	0
Prostate	0	0	0	0
Achromobacter				
Urethra	1	1.6	0	0
Prostate	0	0	0	0
Proteus morgani				
Urethra	1	1.6	0	0
Prostate	0	0	0	0
Hemophilus canis				
Urethra	1	1.6	0	0
Prostate	0	0	0	0

TABLE 3. *Sensitivity studies of four major organisms before and after treatment*

Organism and response to treatment	Penicillin*		Tetracyclin*		Aureomycin		Chloromycetin		Streptomycin	
	No.	%	No.	%	No.	%	No.	%	No.	%
Hemolytic staphylococcus Before After	28 46	37.8 62.2	49 25	66.2 33.8	45 29	60.8 39.2	73 1	98.6 1.4	64 10	86.4 13.6
	8 19	29.6 70.4	13 13	50.0 50.0	14 13	51.4 48.6	27 0	100 0	22 5	81.5 18.5
Nonhemolytic staphylococcus Before After	19 7	73.1 26.9	21 5	80.8 19.2	20 6	76.9 23.1	24 2	92.3 7.7	26 0	100 0
	6 5	50.9 49.1	5 5	50.0 50.0	7 4	63.6 36.4	11 0	100 0	9 2	81.8 18.2
Streptococcus viridans Before After	15 3	83.6 16.7	16 2	88.8 11.2	17 1	94.4 5.6	18 0	100 0	5 13	27.8 72.2
	2 1	66.6 33.4	3 0	100 0	3 0	100 0	2 1	66.6 33.4	1 2	33.4 66.6
Nonhemolytic streptococcus Before After	8 1	88.8 11.2	5 4	55.5 44.5	5 4	55.5 44.5	8 1	88.8 11.2	3 6	33.4 66.6
	4 1	80.2 20.0	4 1	80.0 20.0	4 1	80.0 20.0	5 0	100 0	1 4	20.0 80.0

\* Antibiotics used in this study



TABLE 2. *In vitro* sensitivities in cultures of eight major isolated organisms

Organism	Penicillin*		Tetracyclin*		Aureomycin		Chloromycetin		Streptomycin	
	No.	%	No.	%	No.	%	No.	%	No.	%
Hemolytic staphylococcus Sensitive Resistant	37	36.6	62	62.0	59	58.4	100	99.0	86	85.1
	64	63.4	38	38.0	42	41.6	1	1.0	15	14.9
Nonhemolytic staphylococcus Sensitive Resistant	25	65.8	27	72.9	28	73.7	35	92.1	36	94.7
	13	33.2	10	27.1	10	26.3	3	7.9	2	5.3
Corynebacterium Sensitive Resistant	55	90.1	57	95.0	57	93.4	61	100.0	58	95.0
	6	9.9	3	5.0	4	6.6	0	0.0	3	5.0
Streptococcus viridans Sensitive Resistant	17	80.9	19	90.5	20	95.2	20	95.2	6	28.6
	4	19.1	2	9.5	1	4.8	1	4.8	15	71.4
Nonhemolytic streptococcus Sensitive Resistant	13	86.6	10	66.6	10	66.6	14	93.3	5	33.4
	2	13.4	5	33.4	5	33.4	1	6.7	10	66.6
Hemophilus influenzae Sensitive Resistant	4	57.1	6	85.7	7	100.0	7	100.0	7	100.0
	3	42.9	1	14.3	0	0.0	0	0.0	0	0.0
Bacterium alkaligenes Sensitive Resistant	2	40.0	3	60.0	3	60.0	1	20.0	1	20.0
	3	60.0	2	40.0	2	40.0	4	80.0	1	20.0
Streptococcus pyogenes Sensitive Resistant	7	100.0	7	100.0	6	85.7	6	85.7	0	0.0
	0	0.0	0	0.0	1	14.3	1	14.3	7	100.0

\* Antibiotics used in this study

Sulfadiazine appears to be a very effective drug. If administered with the proper precautions, it is relatively safe; in those patients engaged in active field work where dehydration may come into play, it would probably be better to avoid it, substituting oral administration of a broad-spectrum antibiotic such as Terramycin, Aureomycin, or Chloromycetin. One might speculate that its effectiveness may be related to its relatively infrequent use in the usual gram-positive 'coccal infections. Unfortunately we were not able to do sensitivity studies with this drug.

Our bacteriologic data show a rather high incidence of hemolytic staphylococcus in the urethral and prostatic exudates, higher than reported by most other investigators. This fact, coupled with the observation that the most effective antibiotics and chemotherapeutic agents in this disease are those known to be active against the staphylococcus, leaves one with the distinct impression that these organisms play an important role in its cause.

Although sensitivity studies on isolated organisms were performed, they were not used as a guide in therapy during the period of observation. In those cases that were considered treatment failures, we resorted to the sensitivity studies in an attempt to choose a more effective antibiotic. It is fully realized that in vitro sensitivities of an organism to a particular antibiotic do not always reflect the organism's response to actual treatment of a patient. We feel it is wise to perform cultures and sensitivity tests of the urethral and/or prostatic exudates when the patient is first seen; these can then be used as a guide in the selection of the best antibiotic for initial therapy. If it is impractical to wait for the results of these studies before initiating treatment, the patient may first be given one of the sulfa drugs or one of the broad-spectrum antibiotics, and if response is poor the previously obtained laboratory results can be used in selecting a more potent drug. By such a procedure we feel a higher cure rate can be obtained. In those instances where the population of the base is relatively stable, with few transients being treated, little or no harm is done by waiting for about five days for the results of culture and sensitivity studies. Of course, those patients with an acute, severe prostatitis or seminal vesiculitis should receive immediate treatment.

#### SUMMARY

The effectiveness of the intramuscular form of Terramycin as compared with some other standard forms of treatment in nonspecific urethritis was studied in 57 patients. Ninety-five percent of the patients receiving either sulfadiazine or the oral form of Terramycin were considered cured or improved. Terramycin intramuscularly appears to be of some benefit in the treatment of nonspecific urethritis, although inferior to sulfadiazine and Ter-

TABLE 4. *Results of therapy*

Group	Cured		Improved		Unimproved		Total
	No.	%	No.	%	No.	%	
Control	5	41.7	3	25.0	4	33.3	12
Treated with penicillin	5	41.7	5	41.7	2	16.6	12
Treated with sulfadiazine	5	45.5	6	54.5	0	0.0	11
Treated with Terramycin intramuscularly	5	41.7	5	41.7	2	16.6	12
Treated with Terramycin orally	6	60.0	3	30.0	1	10.0	10
Total	26	45.6	22	38.6	9	15.8	57

## DISCUSSION

Systemic forms of effective medications given orally are usually reserved for treating those patients with serious infections who for some reason cannot take the oral form. This is as it should be, for undeniable in most cases oral administration is easier and more pleasant, is free from pain, and avoids complications (atorile abscess, local tissue reactions, hematomas, acute reactions to the drug, et cetera) that can arise with any injected medication. In addition, this form of parenteral Terramycin contains procaine hydrochloride and therefore has the added risk, though small, of sensitivity to it. However, it was felt that if the intramuscular form showed a clear-cut superiority to the oral form by being as effective in a relatively low dosage and with only very few injections, the disadvantages would be outweighed. The advantages of the intramuscular form would be: (1) the low cost of two to four injections of 100 mg each, as opposed to the higher dosage and more prolonged period of administration with the oral form; (2) more positive control of the patient because the medication is not self-administered, thus avoiding irregular administration by some patients and the wasting of medication; (3) avoidance of gastro-intestinal reactions associated with oral medications; and (4) more certain absorption of the medication. In the dosage and schedule of administration used in our study, the intramuscular form of Terramycin appeared to be slightly inferior to the oral form, and thus justification for its use in this disease does not appear warranted on the basis of our small series. We are currently continuing to enlarge our series of patients receiving this medication and prolonging the period of administration.

# PRINCIPLES OF SURGERY IN MANAGING MASS CASUALTIES

WARNER L. BUTLER, Colonel, MC, USA

**O**RDINARILY one writes an article with a certain amount of knowledge and experience as background, and there are recognized authorities whose pronouncements are relied upon. In the field of mass casualties, such as considered here, however, there are no experts and it must be borne clearly in mind that all who speak or write on this subject base their comments and judgments on analogy with civilian disasters or combat surgery. Such rationalizations may or may not be valid but are more apt to be acceptable than the naive and emotional comments made by academic rather than practical surgeons or by the stonny petrels who use this subject as another excuse to fly in the face of constituted authority. These words sound rather harsh, but in this new field where none of us can speak from experience it is too easy for false leaders to arise and becloud the issue. In a subject as complicated and potentially serious as that of surgery for mass casualties it is especially necessary to define our terms, speak accurately, avoid emotionalism, reassure the defeatists, silence the crackpots, stir up interest in the lethargic, do all in our power to arrive at a proper estimate of the probable situation, and make adequate, flexible plans on such a basis.

It must be emphasized again and again that the basic principles of management for cases of traumatic injury have been proved over and over. These principles may be modified somewhat to meet existing circumstances but will not change radically. All of our effort must be based on an accurate appraisal of the situation and current inventory of the personnel and materiel available, followed by proper triage of the casualties. What we are able to accomplish will be directly related to the number of casualties requiring care as compared to our capabilities from the standpoint of trained people and supplies.

It has been said that thermonuclear warfare is too horrible to contemplate and that, like the chemical agents, no one will dare use them for fear of massive retaliation. Possibly this is so, but no one has advocated that we neglect training to meet the threat of chemical warfare. Neither can we write off thermonuclear war-

ramycin orally. Of those patients receiving no specific therapy, about 65 per cent were considered cured or improved; this points up the difficulty in evaluating any new type of therapy. Bacteriologic studies and the nature of the responses to the various antibiotics used lead one to conclude that the hemolytic staphylococcus may play an important role in causing this disease. Nonspecific urethritis is a disease that may have a rather prolonged course and that is subject to spontaneous remissions and relapses. That it is acquired by sexual intercourse is surmised but by no means proved. Because of the apparent frequency of some degree of prostatic involvement "prostatourethritis" rather than "urethritis" would be a better term for the disease.

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*When there is no explanation, they give it a name, which immediately explains everything.*—Martin T. Fischer

Second is the academic school characterized by the belief that in a disaster all burn patients will have blood potassium determinations, individually calculated diets, massive occlusive dressings, and routine injections of various antibiotics, just as we do for individual patients in a teaching center. Such dreamers envisage evacuation of 100,000 casualties in 24 hours by helicopter to large hospitals miraculously empty of patients and with staffs and supplies ready and waiting. It hardly seems necessary to point out that most hospitals are always full to the doors, that usually they are located in an urban area which will be well within the zone of destruction, and that our available helicopters will accommodate two litters and one sitting patient. For our 100,000 casualties, therefore, allowing 30 minutes per trip and realizing that only daytime flights are possible, it would require 1,388 helicopters; or if we spread completion of evacuation over a three-day period, it would require 463 helicopters. There is not the remotest possibility that even a fourth of this number of helicopters would be available.

Third is the naive school characterized by the belief that we need not stockpile penicillin because we can buy it at any drug-store; or that all we have to do to obtain suture material is to go to the dime store for cotton thread; or that doctors, nurses, and supplies will materialize from surrounding villages in case of disaster to the city; or that there won't be any casualties anyway because we will all jump in our cars and head for the open spaces. In a recent small disaster there were about 30 casualties. The local community in a rather small town was completely incapable, and even with supplies and teams from a fairly distant large city, it was 72 hours before the last patient was operated on. In the recent Los Angeles train wreck there were about 150 casualties. Try to envisage the results of 100 such train wrecks simultaneously in the same city.

None of these seemingly fanciful ideas are fictional, and all have been advanced seriously by various individuals and groups. It would seem, therefore, that our most pressing problem is the injection of realism and common sense into our discussions, with emphasis on doing the best we can with the means at hand.

First, let us emphasize the sheer magnitude of the caseload. When Hiroshima, with a population of about 300,000, was devastated by our smallest A-bomb, 70,000 persons died, 15,000 were reported missing, and from 80,000 to 100,000 persons sustained injuries. This, of course, was in an untrained, unwarned population; but we have an untrained population, and who can say that we will have warning? Furthermore, newer weapons may do a hundred times the damage so that maybe the proportion of from 1 to 3 injuries per 10 population may not be out of line. For San Antonio this would give a figure of about 50,000 to 150,000 casu-

fare this casually. All of our effort in training may be like insurance against fire which does not take place or theft which does not occur. Nonetheless, mature men recognize the need for such insurance. Consequently, we must recognize and properly evaluate the problem, plan for suitable triage which is the core of treatment, set up plans for smoothly functioning organization, arrange for a workable chain of command with clearly delineated authority and responsibility, and finally we must implement a broad training program to cover all estimated needs.

### RECOGNITION OF THE PROBLEM

It might be assumed that because much has been said and written about mass casualties, the problem is well recognized and delineated. This, however, is far from the truth, and there are three distinct schools of thought or lack of thought. First is the muddle headed school characterized by the oft-repeated statement, "We can handle the problem when it arises because we are used to treating cases of trauma every day." This statement, with its tragic implications, is heard often by those who are trying to get something accomplished in the way of civil defense.

For many years the American College of Surgeons has recognized that trauma cases, in general, are poorly treated; and it has been a common saying that it is safer to be wounded in battle than on the streets of one of our large cities. The Committee on Fractures of the American College of Surgeons was revised to become the Committee on Trauma in recognition of the fact that increased emphasis was needed on treatment of trauma in general. If medical practitioners handle individual cases of trauma poorly, what will they do when called on under adverse conditions to handle 50 cases, 100 cases, 1,000 cases, or 10,000 cases? Even physicians with previous military experience function poorly in a civilian disaster of such relatively small proportions as that at Worcester, Mass., in June of 1953, when there were 1,500 injured. The resulting fiasco indicates clearly what can happen when there is no prior planning, no co-ordinated direction of effort, and poor adherence to well-known surgical principles. For example, there was a frenzied interest in drawing blood, so that 950 units in excess of that which was needed were drawn, and because of lack of storage space, questions as to its sterility, et cetera, most of it had to be converted into gamma globulin later. Open fractures were primarily reduced and closed, penetrating head injuries were treated conservatively, patients were operated on without regard for shock, and surgeons worked far into the night by the light of flashlights when power failed, closing wounds primarily without debridement. The Worcester tornado has been well studied and officially documented and those who maintain that civilian physicians can take a disaster in stride are ignorant of fact.

Second is the academic school characterized by the belief that in a disaster all burn patients will have blood potassium determinations, individually calculated diets, massive occlusive dressings, and routine injections of various antibiotics, just as we do for individual patients in a teaching center. Such dreamers envisage evacuation of 100,000 casualties in 24 hours by helicopter to large hospitals miraculously empty of patients and with staffs and supplies ready and waiting. It hardly seems necessary to point out that most hospitals are always full to the doors, that usually they are located in an urban area which will be well within the zone of destruction, and that our available helicopters will accommodate two litters and one sitting patient. For our 100,000 casualties, therefore, allowing 30 minutes per trip and realizing that only daytime flights are possible, it would require 1,388 helicopters; or if we spread completion of evacuation over a three-day period, it would require 463 helicopters. There is not the remotest possibility that even a fourth of this number of helicopters would be available.

Third is the naive school characterized by the belief that we need not stockpile penicillin because we can buy it at any drugstore; or that all we have to do to obtain suture material is to go to the dime store for cotton thread; or that doctors, nurses, and supplies will materialize from surrounding villages in case of disaster to the city; or that there won't be any casualties anyway because we will all jump in our cars and head for the open spaces. In a recent small disaster there were about 30 casualties. The local community in a rather small town was completely incapable, and even with supplies and teams from a fairly distant large city, it was 72 hours before the last patient was operated on. In the recent Los Angeles train wreck there were about 150 casualties. Try to envisage the results of 100 such train wrecks simultaneously in the same city.

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consideration those patients who are beyond our help and concentrate our efforts on saving patients who are salvageable? In World War II prison camps, just such decisions had to be made, as for example when there were 100 prisoners with malaria and 100 tablets of quinine were issued. Do you give each man one tablet, which would do no one any good, or do you concentrate on a few of the men for better end results? It would not seem necessary to bring up such elementary points except for the fact that someone has to say these things in black and white for the sentimentalists and the inexperienced.

Obviously, we must stick to the basic principles of triage, selecting those patients whose condition warrants immediate operation, choosing those patients whose condition indicates resuscitation before operation, and segregating those patients for whom operation is not indicated because of the fatal nature of the condition. The heavy responsibility resting on such decisions indicates clearly why we have always said that the senior man in point of experience is the man for assignment as triage officer. Obviously, also, in mass casualty work, the triage officer must balance his decisions against availability of trained personnel and supplies. It will do no good to select patients for treatment of a shock if there is no intravenous solution, nor will it be sensible to select patients for immediate operation if there are no surgeons. It seems logical to me that our treatment, in the event mass casualties are sustained, will of necessity be on a sliding scale depending on caseload and capabilities. What we need to do is to set up a system of priorities, listing the order in which case groups or procedures will be dropped from consideration as the caseload exceeds therapeutic capabilities. Here is the place for hardheaded practicality and a return to essential elements of basic principles. There is no place here for the sentimental slogan that every man must have the maximum in care and no casualty may be denied treatment. As a matter of fact, we may have to become considerably tougher in our thinking. What of the possibility of using cadaver blood for transfusion? Have any plans been made to include this? Is it possible that we might someday consider using the moribund and hopelessly injured as exsanguination blood donors? Such ideas are repugnant to us now but so is cannibalism until you are starving.

It seems unwise to attempt to set up such a list of priorities herein but certain general points can be stressed. For example, the sorting of patients is a constantly changing thing from the standpoint that the patient's condition changes and availabilities change. A patient in the resuscitation group may change to the immediate operation group when shock is overcome or may change to the "no treatment" group if shock is irreversible. Also, it may be that, faced with a tremendous caseload of abdominal injuries,

we would have to decide that we had neither the time nor the personnel to carry out abdominal exploration, and we would revert to conservative management. However, if suddenly a group of surgical teams arrive for duty, the triage is immediately revised and these patients enter the "immediate treatment" group, if their condition has not deteriorated beyond that point. The sliding scale and constant change with shifting circumstances makes it impossible to set out dogmatic lists and again places a premium on surgical experience and judgment.

Furthermore, presuming that an evacuation system will be possible, triage is repeated at each installation, again because of possible changes in the patients' condition or changes in personnel and supply availability at the different installations. It is re-emphasized that triage is not a final and one-shot decision but is synonymous in some respects with surgical judgment.

### CHAIN OF COMMAND

The moment a triage officer begins to select patients in a civilian disaster for immediate operation or for resuscitation, the concept of chain of command comes up, because every civilian physician within miles will at once question his authority and ask by what right he directs therapy. One of the most difficult points to put across to civilian physicians is the need for teamwork and division of labor for the common good. Each one demands for himself the right to decide what therapeutic procedures he will use and totally rejects what he considers meddling in his business, whether or not he is qualified, being irrelevant to him. We in the military service know the necessity for teamwork and the necessity for at least minimal standardization of therapeutic procedures. In the service it is simple to arrange that only the qualified receive assignments requiring special skills, and probably our patients would do even better were we to exercise more supervision over methods of treatment. In time of disaster, it is essential that previously designated leaders assume control as early as possible to prevent waste of supplies and professional effort. What can happen in the absence of qualified leadership is observed at the site of an automobile accident where a crowd immediately forms. Some want to have the victim lie down with feet elevated, some want to support him and have him walk around, some want to loosen his clothing, others want to apply a splint. The Worcester tornado again is a good example of what should not happen. Without leadership, one hospital became completely overrun with patients and relatives while another hospital nearby received almost no admissions. Doctors climbed over patients in the ambulances, trying to treat them instead of establishing a flow of litters to the emergency room. There was no designated authority and, therefore, no co-ordination between the blood collectors and the blood users.

At present, there is no one to assume command in civilian communities should a disaster strike, and usually the armed services are called in to organize the effort. It seems possible that in the event of mass casualties, martial law will be declared, thus making the military responsible. Therefore, it is highly desirable that we be ready and prepared to assume this role. Unfortunately, there is no current mechanism whereby any person or group can exert any pressure to get civil defense rolling. If a city does not have the urge to prepare, it simply ignores the problem. Anyone who has ever tried to speak on civil defense to a civilian audience realizes the depth of the apathy which exists. All of our wars in recent years have been fought on foreign shores, why not the next one? None of our cities have ever been bombed, why worry about such a remote contingency? If anything is to be our undoing, it will be the disinclination to appoint responsible leaders and follow their directions.

### ORGANIZATION

It is all very well for surgeons to talk about what they will do in the event of mass casualties, but actually nothing will be accomplished unless there is a very efficient, preplanned organization which will get the doctor to the patient or the patient to the doctor, assure a steady flow of supplies, provide for evacuation of patients, and do the hundred and one things which the surgeon will be too busy to bother with. This preplanned organization is familiar to the military man but is unfamiliar and repugnant to civilians who proudly rebel at "regimentation" or interference with their "freedom of action." Without organization, in the event of disaster, they will be free to die and that is about all. The plans must include provision for warning and continuing communication so that orders and directives may be disseminated. Block and area wardens must be ready and previously trained to supervise rescue work and first aid as well as police protection and fire fighting. Very early, engineers must be ready to bulldoze roadways through the rubble, and then immediate traffic control will be essential. According to a preconceived plan, litter teams and other conveyances then can start evacuating patients to aid stations where triage, resuscitation, and first aid will be done and where food and shelter will be provided. Here, or close by, the medical regulating officer must direct evacuation to designated emergency hospital areas or special treatment centers. During all this, the supplies must be coming forward, immunization and public health matters must be taken care of, and welfare work must be progressing. This is indeed a complicated organizational setup but one which is routine for the combat forces, and the civilian group might well copy the military organization in the event of mass casualties. Such an organization does not spring up overnight, nor does it develop like Topsy without direction.

## TRAINING PROGRAM

The training program must be an extensive one, covering all of the functions listed in the previous section on organization, and most persons in the civilian community could well afford to become proficient in at least one of these fields. In addition, every individual should be qualified in first aid and the elementary technics of survival. It is true that the American Red Cross and the Boy and Girl Scouts have shown interest in first aid, but this should be pushed vigorously so that every individual is qualified. First aid and self-help may be lifesaving in an emergency.

Some plans have included formation of definitive teams such as surgical, shock, orthopedic, et cetera, similar to the teams of the Auxiliary Surgical Group of World War II. Currently, we consider that such teams are wasteful of personnel and most are unnecessary. Furthermore, in the holocaust of disaster the team members may be widely separated and it would be better to have the members basically qualified in first aid, insertion of an intravenous needle, giving of a hypodermic injection, sterile technic at the operating table, functions of a circulator, and possibly administration of ether under supervision. Formation of rigid teams with clearly delineated jobs may be too specialized for the needs.

It seems necessary to mention specifically some things in which laymen should not be trained. Currently there is some thought that large groups of people should be taught how to do a tracheotomy. This seems to me to be entirely unsound and dangerous. We find that very few physicians have actually performed tracheotomy and relatively few are sure of the indications. How, then, can we expect laymen to know when to do the operation even if they know the technic? This seems to me to be dangerous and an evidence of muddled thinking. We have always had the same difficulty with such an apparently simple thing as the tourniquet. You can teach any moron *how* to use a knife but can you teach him *when* to use it? We would do well to teach things to laymen which do not depend on professional judgment.

Finally, it seems likely that in the event of mass casualties there will be a shortage of surgeons, and we envision one surgeon acting as triage officer while another supervises as many as six operating tables where physicians who are not trained surgeons are doing such things as wound débridement. This supervisor could actually take a hand in more technical procedures, still being free to oversee the other tables. In this way, while professional competence might be somewhat lacking, at least a greater volume of work could be turned out than by one surgeon alone.

## SUMMARY AND CONCLUSIONS

Because there are no experts with experience in managing mass casualties, many impractical and academic thoughts have been expounded as gospel.

The basic principles of military surgery, based on proper selection of patients, still are sound.

Mass casualties still will be composed of the types of injuries we are accustomed to treat, and the difference will be in the extremely large numbers and the suddenness of their occurrence.

Proper sorting of patients and decision as to what can be accomplished must be based on an accurate estimation of the situation from the standpoint of the caseload requiring care as contrasted with the availability of trained personnel and supplies.

Adequate functioning in time of disaster will depend on prior planning, a definite chain of command with delineation of authority, and a suitable organization which takes into account all of the elements needed to find, evacuate, resuscitate, and treat the injured.

A training program, broad in scope but not requiring surgical judgment of laymen, is essential.

Less talk, more common sense, and some action would seem to be highly desirable.

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THE ENERGY OF THE A-BOMB

The energy of a nominal A-bomb (equivalent to 20,000 tons of TNT) is  $2 \times 10^{13}$  cal. This is divided into thermal and kinetic energy although the latter will also ultimately be converted into thermal energy. The thermal energy from the sun falling on 1 square mile of Nevada ground during an average spring day supplies as much heat as two nominal bombs. The energy released by the condensation of water in a typical thunderstorm is equivalent to 13 nominal bombs. Further comparisons with natural phenomena reveal similar statistics suggesting that the energy of an A-bomb, while tremendous compared with the energy of other man-made explosions, is relatively small compared with that of many natural phenomena.

—L. MACHTA and O. L. HARRIS  
in Science, p. 78, Jan. 21, 1955



## Clinicopathologic Conference

William Beaumont Army Hospital, Fort Bliss, Tex.\*

### ABDOMINAL PAIN AND ANOREXIA

**Summary of Clinical History.** A 25-year-old male veteran was admitted directly to this hospital on 17 September 1953 from a civilian hospital because of a three-week history of weight loss and pain in the abdomen and back.

He had worked as a filling station attendant since discharge from the Army in April 1953. His past health had always been good. Family history was noncontributory. About 1 September 1953, he developed a constant severe bilateral low lumbar back-ache. In a few days this pain seemed to radiate around both flanks to the abdomen. There was no relation to food intake and no nausea, vomiting, or bowel dysfunction. His appetite fell to nothing. He was admitted to a civilian hospital on 3 September 1953 and treated initially with salicylates for a strained back. It was necessary to use narcotics to control abdominal pain. At this hospital roentgenograms of the chest, abdomen, and spine revealed no abnormalities. A barium enema and gastro-intestinal roentgen series were likewise negative. Intermittent fever and constant polymorphonuclear leukocytosis were noted. The patient lost about 20 pounds in weight, going from 150 to 130 pounds in the two weeks prior to admission to this hospital.

**Physical Examination.** The patient was a poorly nourished young man in marked distress from back and abdominal pain. The height was 6 feet; weight, 130 pounds; temperature, 101°F; pulse, 110

\*Col. Abner Zehm, MC, USA, Commanding Officer. From the Medical Service, Col. Maurice C. Davidson, MC, USA, Chief.

per minute; and blood pressure, 120/70 mm Hg. The tongue was dry and oral hygiene poor. Examination of the head and neck was otherwise not remarkable. The optic fundi appeared normal. The lung fields were clear to percussion and auscultation, and the heart was not enlarged to percussion. The sounds and rhythm were normal except for tachycardia. No adventitious sounds were heard. The abdomen was flat and generally tender. There was no localized tenderness or true rigidity. The liver, spleen, and kidneys could not be palpated and no masses were felt. Rectal and genital examinations were normal except for a small, soft nodule above the right testis. The back showed paravertebral and sacroiliac tenderness with limitation of all low-spinal movements due to pain. The extremities showed no abnormalities, and neurologic examination was within normal limits. Slightly enlarged lymph nodes were felt in both axillae but no other lymphadenopathy was noted.

**Laboratory Studies.** On admission urinalysis was normal. The specific gravity was 1.015; sugar and albumin negative, and only an occasional white blood cell on microscopic examination. The hemoglobin was 12.3 g/100 ml; the red blood cell count, 4,090,000/ $\mu$ l. The white blood cell count was 28,000/ $\mu$ l, with 92 per cent polymorphonuclear leukocytes, 5 per cent lymphocytes, 1 per cent monocytes, and 2 per cent eosinophils. The sedimentation rate was 36 mm/hour (corrected) by the Wintrobe method. The serologic test for syphilis was negative. The spinal fluid contained no cells, and chemical and serologic studies on the fluid were normal. Repeated stool examinations showed no blood, parasites, or ova. Blood cultures were sterile. The white blood cell count and sedimentation rate remained elevated. Urinalyses remained negative. Agglutinations for *Brucella* were negative, and those for typhoid H and paratyphoid A showed low titers of an immunized individual. Serum amylase was 64 units. Gastric analysis revealed 6 units of free hydrochloric acid. Urine examinations for porphyrin and porphobilinogen were negative. Liver function tests were normal except for a cephalin-cholesterol flocculation of 3 plus in 24 hours and a thymol turbidity of 12.7 units. Bone marrow aspirated from the iliac crest showed mild myeloid hyperplasia. Roentgenograms of the chest, abdomen, and spine were normal. Cholecystograms, intravenous uregrams, a barium enema, and an upper gastro-intestinal series revealed no abnormalities. An electrocardiogram was normal.

**Course in Hospital.** During the first month of hospitalization the patient remained febrile, the temperature spiking from 99° to 102.5°F daily. He complained more and more of severe upper abdominal pain. This was intermittent, occurring three or four times daily, and was relieved only by narcotics. There was no sign of peritonitis or localized abdominal infection. Penicillin

and streptomycin sulfate were given empirically for several weeks. On 2 October 1953, a single white blood cell differential count showed 13 per cent eosinophils. On 4 October 1953, he complained of numbness and aching in the feet and the calf of the left leg. Marked weakness of dorsiflexion of the right foot was noted, and the Achilles jerk reflex was absent on the left. An area of hypesthesia appeared on the right ankle. These findings slowly cleared only to be followed by transient left ulnar palsy.

On 6 October, specimens for biopsy were taken from a lymph node from the left axilla and from the left pectoralis major muscle. Both specimens were normal, showing no pathologic changes on microscopic examination. A biopsy specimen from a right axillary node later showed only nonspecific hyperplasia.

By 18 October, the patient weighed 108 pounds. At the suggestion of a consultant, who felt that amebic abscess was not excluded, the patient was started on a course of emetine hydrochloride. He received 1 gram daily intramuscularly for six days. During this time fever subsided slightly. Electrocardiograms showed no abnormality. After the course of emetine he was given Terramycin (brand of oxytetracycline) intravenously for several days in hopes of treating any concealed infection. On 26 October 1953, three days after emetine was discontinued, he developed a gallop rhythm. Electrocardiogram showed flat T waves in the limb leads and inversion of T waves in precordial leads  $V_2$  and  $V_6$ . A roentgenogram of the chest showed an increase in the heart size and congestive changes in the lung fields. A brief episode of pulmonary edema was precipitated by the intravenous administration of fluids. This responded promptly to morphine, oxygen, digoxin, and Mercuhydrin (brand of meralluride sodium). Electrocardiograms continued to show a pattern of myocarditis though digoxin was discontinued.

On 5 November 1953, he was transferred to the Surgical Service in preparation for exploratory laparotomy. His temperature had returned to normal, but leukocytosis was still found, and the severe abdominal pain continued. Nasogastric suction was applied with little relief of his pain. Transfusions of whole blood were given prior to operation because of mild anemia.

During the last part of the operation the patient became severely hypotensive and cyanotic. Abdominal closure was performed as quickly as possible and he was given 20 ml of aqueous adrenal cortex extract intravenously, which returned the blood pressure to normal. He returned to the ward in fair condition and started taking fluids orally by the third day. Electrocardiograms during the first postoperative week indicated that an anterior myocardial infarction had been sustained. Immediately after operation the



blood pressure began to rise, reaching an average level of 160/120 mm Hg. Along with this development albuminuria appeared for the first time.

#### DISCUSSION

Doctor Abildskov:\* This is a difficult case because in spite of the length of the protocol there are very few positive findings. We have a great number of findings, but most are on the negative side of the ledger and are not very helpful in arriving at a diagnosis. We could name a good many things the patient probably does not have, but this is not a productive approach in the absence of enough positive findings to point toward the correct diagnosis. With the few positive findings which are available I am not even certain whether this patient's disease was neoplastic, degenerative, inflammatory, or toxic, and actually, diagnoses from all of these categories can be considered. To emphasize the sparsity of positive findings I would like to list all of those that I found in the protocol.

First of all, we know the patient was 25 years old. In general we tend to think of different disease entities in 25-year-old patients than we do, for example, in 65- to 75-year-old patients; but in this case even this type of reasoning does not appear to apply since the patient is said to have developed electrocardiographic evidence of myocardial infarction, and this is not one of the entities commonly considered in 25-year-old patients. Secondly, we know something about his occupation. Occupational history may be extremely significant and again may be completely unrelated to a patient's illness. For what it is worth, we know that this patient was a filling station attendant prior to the onset of his illness. We also know that his illness had a relatively sudden onset. His initial symptom was pain in the lumbar region and he later developed abdominal pain which became a prominent feature of his illness. The patient was anorexic and had a weight loss amounting to 20 pounds in the two weeks preceding admission to this hospital.

As far as physical findings are concerned, there were very few positive ones. His illness was characterized by fever with the temperature on occasion rising as high as 102.5°F. Apparently his abdominal tenderness was not well defined, and the vague nature of this tenderness may actually be of help in arriving at a diagnosis. A small nodule above the right testicle is described but is not mentioned again. We do not know what happened to this nodule during the course of his illness. He had sacro-iliac tenderness, pain on motion of the lumbar spine, and slightly enlarged axillary nodes. Later in the course of his illness he had a rising blood pressure, cardiac enlargement, gallop rhythm, and other evidences of congestive failure. One of the most interesting findings was a transient peripheral neuritis involving the ulnar nerve and producing a definite foot drop.

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\*Capt. J. A. Abildskov, MC, USA, Department of Medicine.

From the laboratory we have what is probably the most striking feature of his illness, namely, a consistent and marked leukocytosis. The white blood cell count was as high as 28,000/ $\mu$ l with a marked increase in polymorphonuclear leukocytes, and, while it is not mentioned, I presume a marked shift to the left. He also had a mild anemia, but we are not given sufficient data to define the anemia morphologically and probably the morphology would not be especially helpful. He had an increased sedimentation rate, minimal evidence of liver dysfunction manifested by a cephalin-cholesterol flocculation of 3 plus and a thymol turbidity of 12.7 units. A bone marrow examination was done and I think this examination is extremely important in ruling out several diagnostic possibilities which might otherwise be considered in this case. The bone marrow showed only mild myeloid hyperplasia and probably cannot be related in any specific way to the illness. One white blood cell count only, out of many reported, showed a marked eosinophilia. Urine examinations were consistently negative during the initial phases of his illness, but he later developed albuminuria. Coinciding with the development of clinical evidence of cardiac disease, he developed electrocardiographic changes of a nonspecific type and later is said to have had the electrocardiographic findings of acute myocardial infarction.

These are all of the positive findings I was able to get out of the protocol. On the negative side we have a host of findings, but I will not attempt to evaluate the significance of each of these. Some of the more important negative findings include the absence of splenomegaly, hepatomegaly, and more marked and definite lymphadenopathy. The absence of these findings is helpful in leading us away from several specific illnesses but is not particularly helpful in leading us toward a definitive diagnosis.

Approaching this case from the standpoint of what must have appeared to be the major positive findings, namely, abdominal pain, tenderness, fever, and leukocytosis, there are a great many diagnostic possibilities. For example, acute appendicitis followed by rupture and abscess formation would explain many features of this illness. There is nothing, however, which leads us to particularly favor that diagnosis over several other possibilities. We should also consider acute cholecystitis. He did have, at some stages of his illness, right upper quadrant pain, and certainly this disease process commonly causes such pain, leukocytosis, and fever; again, however, nothing leads us to particularly favor that diagnosis. Pyelonephritis should probably be considered in a patient with back pain, leukocytosis, and fever; however, in the absence of urinary findings early in the course of his illness this becomes very unlikely.

If we consider some of the less prominent features of this patient's illness we are led to consider some of the less common disease processes. The patient had a nodule which is described as lying above the

right testicle. Is it possible that this represented a testicular neoplasm and could such an entity account for any or all of the features of this patient's illness? Neoplasm, wherever it arises, the testes being no exception, can certainly cause febrile illness. No objective evidences of metastasis were found; however, I think this type of disease should be listed among the diagnostic possibilities.

This patient had a debilitating disease with weight loss and fever, which fits the description of Pel-Ebstein fever. Hodgkin's disease certainly must be considered; however, in this case we have the information that a biopsy specimen of a lymph node did not show any pathologic changes. If Hodgkin's disease is present, it is probably localized in the abdomen. This diagnosis has the additional virtue of possibly explaining the periphetal neuritis. This is an infrequent finding but has been reported in patients with Hodgkin's disease.

In considering a patient with an obscure febrile illness, tuberculosis should be mentioned. Again, there is nothing which particularly favors this diagnosis over several others but it must be placed on the list of possibilities.

Some of the other unusual features of this patient's illness were a rising blood pressure, cardiac enlargement, gallop rhythm, transient peripheral neuritis, and the occurrence of albuminuria. All of these findings may be unrelated to the primary illness. For example, the elevated blood pressure and the albuminuria occurred following an episode of shock during an operation. These could be the result of acute renal failure or lower nephron nephrosis. The cardiac enlargement, gallop rhythm, other evidence of congestive failure, and the electrocardiographic findings occurred a few days after emetine therapy had been given. If these cardiac findings were the result of emetine toxicity, it is surprising that electrocardiographic changes did not occur during the course of therapy.

If all or most of the findings in this case are the result of the primary disease, one particular diagnostic possibility seems to explain them better than any other entity. This is not a diagnosis which is established clinically. It is a diagnosis which is to be suspected clinically, but confirmation depends on biopsy. This entity is periarteritis nodosa. This disease can certainly produce an illness with an acute onset. More commonly it has an insidious onset, but in a significant number of cases the onset is explosive. Patients who are eventually found to have periarteritis nodosa nor infrequently are subjected to laparotomy, at which time the diagnosis is suspected from the appearance of the blood vessels or is confirmed by examination of a biopsy specimen of, or removal of, an organ such as the gall bladder. This diagnosis would account for the febrile nature of this illness and the severe abdominal pain and tenderness. Pain in the back is a fairly common finding due to periarteritis nodosa, as is a moderate degree of lymphadenopathy.

This is the single diagnosis which, it seems to me, will link the initial features of this patient's illness with the positive findings that developed during his course in the hospital. Hypertension, albuminuria, and the cardiac findings are all consistent with this diagnosis. Approximately half of the patients with periarteritis nodosa develop hypertension, and this finding is one of the excellent physical signs helping to substantiate this diagnosis. This diagnosis would also account for the otherwise puzzling finding of acute myocardial infarction in a 25-year-old man. Peripheral neuritis also fits very nicely with this diagnosis. Commonly, the patient with periarteritis nodosa will complain of pain in the legs; however, this patient did have definite peripheral neuritis involving both the lower and upper extremities.

Most of the laboratory findings given are consistent with the diagnosis of periarteritis nodosa. Leukocytosis of this degree is not the rule but on the other hand is not unheard of. Mild anemia is a fairly consistent finding in this disease, and minor abnormalities in liver function are well known to occur during its course. This diagnosis could also account for the eosinophilia, which is often transient, and for the albuminuria, which is a fairly consistent finding at some time during the course of periarteritis.

I think we should also consider some other diagnostic possibilities although none of these appear to me to account for the findings in this case as completely as does periarteritis nodosa. For example, the diagnosis of amebiasis and amebic liver abscess should be considered. This diagnosis was actually strongly considered during life, and the patient was given a therapeutic trial of emetine. Since we now know that there was no dramatic response to emetine, this diagnosis does not appear to be as likely as it must have appeared during the course of the patient's illness. Pyogenic abscess of the liver must also be considered, as must other localized accumulations of pus in the abdominal cavity, but again there is nothing which leads us particularly toward those diagnoses. One other possibility which should be strongly considered relates to this man's occupation. We know that he worked in a filling station, that he had an illness in which fever and abdominal pain had prominent features. Under these circumstances lead poisoning certainly appears to be a possibility.

Doctor Martin:\* At operation the patient was found to have some obviously abnormal vessels in the region of the gall bladder; these were sclerotic and almost white. The gall bladder was removed, mainly because of these abnormal arteries, and not so much because it looked like a "hot" gall bladder. The early postoperative period was marked by the development of hypertension and the appearance of albuminuria. There was not much relief from the abdominal pain that was to dominate

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\*Maj. Thomas S. Martin, MC, USA, Assistant Chief, Department of Medicine.

the picture for the rest of his days, a span of about seven months. During that time he did not have a steadily progressive course but had some ups and downs which may well have been related to therapeutic effort.

About two weeks after operation 100 mg of cortisone a day was begun, which caused very definite reduction of his toxic symptoms, fever, anorexia, leukocytosis, and eosinophilia. The red and white blood cell counts returned to normal, and during December he gained nearly 20 pounds, reaching approximately 103 pounds. There was some lessening of abdominal pain. However, as might have been expected, there was no improvement in the albuminuria or hypertension. Late in December he "escaped" from the cortisone therapy, whereupon pain and anorexia increased and he again began to lose weight. The blood pressure was now running in the region of 190/130 mm Hg, and early papilledema had appeared, with retinal exudate. His urine was consistently showing 3 to 4 plus albuminuria and casts.

He was then begun on hexamethonium and Apresoline (brand of hydralazine hydrochloride) orally. Mercurials were used successfully with low salt intake to combat mild congestive failure that had taken place. On the antihypertensive agents there was a return of the blood pressure to levels at the upper limit of normal. With this there was considerable improvement in appetite and tendency to gain weight returned. The opiate requirement fell from four or five injections a day down to one or two. Then in early February there occurred a pneumonitis with chest pain and consolidation in the right lower lobe and fever. Bacteriologic and bronchoscopic studies were negative, and it was not certain whether the involvement was infectious or anetitic. But he was taken off cortisone and placed on penicillin and streptomycin. The lung involvement apparently disappeared, but the rest of the picture became worse.

In early March cortisone was re-instituted at the level of 75 mg a day, and there was some general improvement. However, the hypertension became worse. The parenteral form of hexamethonium was then begun in place of the oral form and the dose increased to a maximum of 50 mg every eight hours. This proved effective and the azotemia which had developed disappeared, the retinal lesions regressed, and the tendency to pulmonary edema subsided. However, this time, although the cardiovascular signs and symptoms improved, abdominal pain and anorexia remained unchanged.

His physician decided that a good deal of the complaint might have been due to opiate addiction and with considerable difficulty weaned the patient off all opiates except one or two doses of codeine per day. This was followed by the best three weeks (the first three weeks of April) that the patient had had since entering the hospital. His weight returned to a little over 100 pounds, albuminuria all but disappeared, papilledema disappeared, and anemia regressed. He was up and about

June 1956)

for several hours a day. Then in later April the flank and abdominal pain became worse, and he was soon taking three to four shots of morphine or Demerol (brand of meperidine hydrochloride) daily. His nutritional state rapidly worsened again.

All sorts of measures were tried to find the organ or organs which were the seat of the pain and to relieve it. It was presumed the pain was caused by ischemia due to impaired arterial blood supply, but the patient never showed any gross signs of infarction of the bowel such as bloody stools or change in bowel habits. Liver function tests remained reasonably normal. There were no changes in sensation over the abdomen to indicate neuritis in the nerve supply of the abdominal wall. He did develop a sudden, severe pain in one testicle that subsequently atrophied; this was considered to be evidence of occlusion of an artery on that side. He was tried on a period of parenteral nourishment only. A trial of 300 mg of cortisone per day for several days instead of the usual 75 mg accomplished nothing. Hexamethonium was removed temporarily, but this measure also was unavailing and only allowed a prompt rise in his systolic and diastolic pressures. Restoration of hexamethonium was again effective in controlling the blood pressure. However, during May he apparently became insensitive to hexamethonium and, even though its administration was pushed to the point of bowel and bladder stoppage and Urecholine (brand of bethanechol chloride) was used, no drop in blood pressure could be noted following an injection. The drug was therefore discontinued.

The great pain in the abdomen and flanks and a substernal burning with dysphasia (which was not relieved by antacids or massive vitamin therapy) dominated the picture until the final phase of his illness. On 29 May the anesthesia department, in response to a plea for help in alleviating the severe pain, performed a subarachnoid alcohol block of the lower dorsal and upper lumbar segment. During the next two days the patient was satisfied with only one injection of Pantopon per day. Then on the night of 31 May he seemed confused and was careless of his privacy, urinating on the floor. The next morning he was found to be stuporous and shortly exhibited a left-sided Jacksonian convulsion. The blood pressure was 204/150 mm Hg, and papilledema was evident. Hexamethonium was resumed and was found to be effective, and it was simple to keep his blood pressure at a reasonable level.

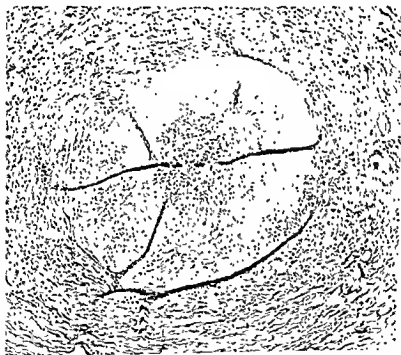
For the remaining six days of his life he never regained consciousness, although he showed a slight evolution toward a conscious state, so that before his death he had begun to respond to slight stimuli, look around, clear his throat, cough, et cetera. After the institution of anti-convulsive medication the first morning that he exhibited a seizure, convulsions did not recur. However, he continued to show twitching of the face and, to some extent, of the arms. It occurred to us that the twitching and perhaps some of the other neurologic findings might be due in part to opiate withdrawal. However, a large dose of Demerol did not affect any of the signs. We thought he had had some small hemor-

changes in the right motor cortex and internal capsular area. He died early on the morning of 7 June without a preceding downward trend in the vital functions, suggesting that he had had a fresh cerebral vascular accident.

**Dr. Abildskov's diagnosis:**  
**Periarteritis nodosa**

**PATHOLOGIC FINDINGS**

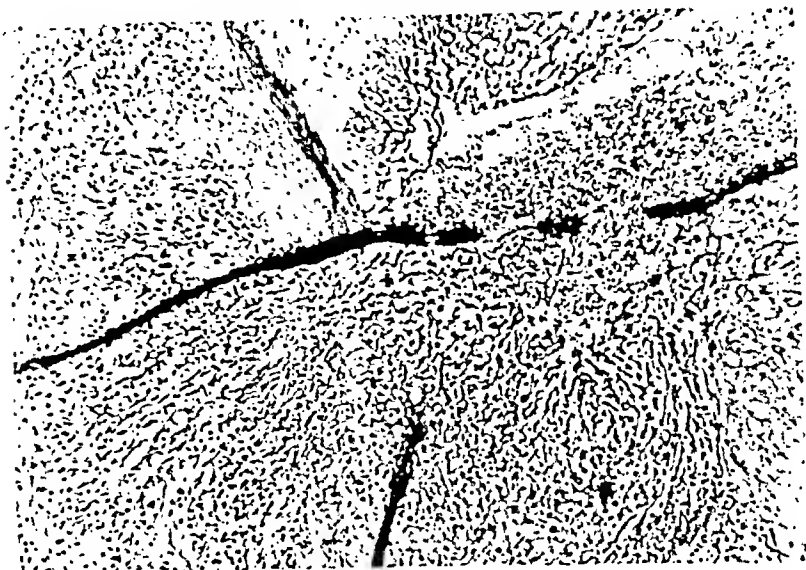
Doctor Heslington:\* The operation performed was a cholecystectomy. The gall bladder was of normal size but with a slightly thickened wall. The mucosa was ulcerated inferiorly and the ulcer was covered by adhering brown crystals. The cystic artery and its branches were greatly thickened with pinpoint lumina (figs. 1 and 2). No aneurysmal dilatation was seen. The most striking microscopic change was in the vessels,



*Figure 1. Section of cystic artery, showing necrosis of a portion of the wall with exudate in and about the wall. Adventitial thickening is extreme.*

mainly the small elastic and muscular arteries. These showed spotty but widespread periarteritis nodosa. The lumina of the vessels showed marked to extreme narrowing, and some were thrombosed and recanal-

\*Maj. Hurston F. Heslington, MC, USA, Chief of Anatomic Pathology Section, Laboratory Service.



*Figure 2. Higher power of section shown in figure 1 showing abundant fibrin and numerous histiocytes and polynuclears with necrosis.*

ized. Active lesions were also present. In these there was necrosis of a part of the wall, usually including the muscularis, with partial replacement by fibrous tissue and inflammatory exudate. Histiocytes predominated in the exudate, but polynuclear leukocytes were numerous. The adventitia of the vessels was extremely thickened and infiltrated with inflammatory cells similar to those seen in the wall proper. The lesion at times involved almost the entire circumference of the vessel, particularly the adventitial thickening. In other instances the changes were eccentric, involving only a portion of the wall. Similar but less marked changes were present in some veins. The lesions varied from acute to healed. The mucosa of the gall bladder was somewhat thickened, and there was increased pigment in the epithelial cells. There were heavy deposits of pigment overlying the mucosal ulcers. These were apparently secondary to ischemia as the result of arteritis. The diagnosis was essential polyarteritis of the cystic arteries and veins.

At autopsy the periarteritis was seen to involve the vessels of the heart, lungs, pancreas, adrenals, kidneys (fig. 3), and brain. In all these organs there was evidence of infarction or softening. The characteristics of the vessel lesions were a patchy distribution with segmental involvement, involvement of large muscular arteries, particularly about their points of branching, and marked variation in the ages of the lesions. Those in the gall bladder wall were acute with marked exudative features, while at autopsy most of the lesions were quiescent or active with little evidence of exudation. The lesions in the kidney showed a





Figure 3. Low-power photomicrograph of section of kidney, showing vessel lesions, infarction, interstitial fibrosis, atrophy, and dilated Bowman's spaces.



Figure 4. Section of arcuate artery of kidney, showing lamellar thickening of intima and partial to complete replacement of the muscle. Some necrosis, but exudative features minimal.

replacement of the muscle by fibrous tissue with little necrosis (figs. 4 and 5). The pictures of the vessels in the gall bladder and of those in



*Figure 5. Longitudinally cut arteriae rectae in kidney, showing changes similar to those in the arcuate artery.*

the kidney illustrate well the differences in the two lesions. Superficially, the lesions of the renal vessels resemble somewhat those seen in thromboangiitis obliterans. It is of some interest that the vessels of the gastro-intestinal tract showed no involvement, either grossly or microscopically.

**Pathologic diagnosis:**  
**Periarteritis nodosa**

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*It takes fifty years from the discovery of a principle in medicine to its adoption in practice.—Martin T. Fischer*

# EMOTIONAL STATUS OF THE U. S. SOLDIER AND LENGTH OF TOUR IN KOREA

ARTHUR ROBBINS, *First Lieutenant, MSC, USA*

**A** CURRENT problem is determination of the deleterious effect of the length of tour in Korea on the mental health of the enlisted man. Complaints of boredom by enlisted men and officers alike have often been made to both staff and command officers concerning the 16-month tour. The separation from family and loved ones, the over-all restriction, and the long, arduous routine of field duty have all been pointed out by medical personnel as contributing to a pervasive strain on the personality structure. The goal of this study is to shed an objective light on the relationship, if any, between a number of emotional indexes as found in psychologic examinations and duration of stay in Korea. More specifically, we wish to explore the relationship of thematic apperception themes and psychosomatic check-list complaints to the months of duty percentwise completed in this area by the United States soldier.

Two hundred U. S. soldiers were selected at random from the entire 35th Infantry Regiment. At the time of examination this particular organization was in reserve. All subjects expected to spend at least 14 months in Korea. In order to have a relatively equal distribution for comparison, the total population was first broken down into quartiles (according to length of tour completed), and then 50 were selected at random from each group.

Two principal instruments were used in the study. A psychosomatic check list was extracted from the Hypochondrias Scale of the Minnesota Multiphasic Personality Inventory. Interspersed with these items were a number of buffer questions to make the list as unstructured as possible. A Thematic Apperception Test was also administered to evaluate some of the needs and pressures operating within the soldier. The instrument consists of a number of pictures about each of which the subject is requested to make up a story. The principle underlying the instrument is that, in relating a story, a person organizes material from his own experiences, immediate perception of the stimuli, and the associations to those perceptions selected from conscious imagery. Cards 1,

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From 344th General Dispensary, APO 503, San Francisco, Calif. Dr. Robbins is now at Family Consultation Service of Eastchester, Tuckahoe, N. Y.

2, 3, 4, 6, 7, 8, 12, 13, and 18 were used for this purpose. The following variables were analyzed by the examiner:

1. Physical aggression
  - a. Nondirected
  - b. Against the male
  - c. Against the female
  - d. Against the male and female
2. Verbal aggression
  - a. Nondirected
  - b. Against the male
  - c. Against the female
  - d. Against the male and female
3. Affiliation
4. Abasement
5. Escape
6. Sexual misidentification
7. Lack of past
8. Lack of outcome
9. Constriction

Finally, an information form requesting various identifying data was filled out by each enlisted man. Table 1 gives the various descriptive data of 191 U. S. soldiers. Nine subjects were lost from the original 200 because of rest and recuperation leave, temporary duty, or other special assignments. Unfortunately, there were little, if any, comparative statistics available to judge the normality of our sample. One may note, however, that the group appears to be a fairly typical one. Thus, the greater part of the sample fell in the age group of 18 to 21, were largely privates, of the Caucasian race, and were, in the large part, Protestants. In addition, the average soldier of this sample was single, of average intelligence, of near high school education, and lacking in combat experience.

#### PROCEDURE

During the latter part of May 1954, a research team\* composed of one clinical psychology officer, four clinical psychology technicians, and one social worker technician visited the 35th Infantry Regiment. The subjects were informed that the study was part of

\*1st Lt. Arthur Robbins, MSC, USA, Project Coordinator; 1st Lt. Leonard Pearson, Assistant Coordinator; Pvt. Wilmer R. Cozens, Chief Statistician, PFC Jack Kilberg, Assistant Statistician, Examiner; Pvt. James Hearst, Judge, Examiner; PFC Robert Elliot, Outside Judge, Examiner; PFC Joseph Kennedy, Examiner, Assistant Statistician; and Sgt. Tony Ambrosio, Social Worker, Examiner.

a research project being conducted by the Medical Department. They were further instructed that the results were to be used for later comparison with those of other soldiers taking the same test. Confidentiality was assured. A clinical psychology technician, using a standard set of rules extrapolated from Murray,<sup>1</sup> administered to each subject the Thematic Apperception Test. The only identifying material requested at that time was the subject's name and serial number. Afterwards, the social worker technician administered the check list and the information blank to the soldiers.

TABLE 1. Description of 191 U. S. soldiers selected at random from the 35th Infantry Regiment

Category	Percent	Category	Percent
Age		Religion	
18-21	60	Protestant	62
22-25	38	Catholic	35
26 and over	2	Other	3
Rank		Marital status	
Sergeant	8	Married	26
Corporal	15	Single	74
Private	77		
Race		A. F. Q. T.* score	
Caucasian	88	89 and under	37
Negro	9	90-109	48
Other	3	110-119	10
		120 and over	5
Education (years)		Combat time (months)	
0-6	7	1	1
7-9	27	2	11
10-12	52	3	8
13 and over	14	4	6
		0	74

\*Armed Forces Qualification Test

The definitions for each variable were extracted from the extensive work of Murray. A short summary of each definition is offered in the following paragraphs. However, for the more extensive definitions used in this study, one should refer to *Explorations in Personality*.<sup>2</sup>

1. *Aggression*. To overcome opposition forcefully; to fight; to avenge an injury; to attack, injure, or kill another; to oppose forcefully or punish another.

2. *Abasement*. To submit passively to external forces; to accept injury, blame, criticism, punishment; to surrender; to become resigned to fate; to admit inferiority.

3. *Affiliation*. To draw near; enjoyably to co-operate or reciprocate with an allied object, an object that the subject likes or that resembles the subject; to please and win affection.

4. *Escape* (harm and blame avoidance). To avoid pain, physical injury, illness and death, humiliation, shame, ridicule; to avoid failure.

5. *Sexual misidentification*. To misidentify the sex of anyone pictured in the stories using McFarland's Criteria.<sup>1</sup>

6. *Constriction*. Measured by the total number of words used by the subject in telling the stories.

In variables 1 to 4, the direction and central object of the story was of little importance in determining the score. Aggression, however, was further broken down into medium of expression and directed object. Intensity was not scored in the analysis. A score of 1 was given to the subject if a particular variable was detected in a story. As 10 cards were used, the range of frequency scores thus varied from 0 to 10.

In order to ascertain the reliability of the examiner's judgment, an outside judge analyzed 37 records at random and applied the same set of rules. The percent of agreement between the two raters ranged from a low of 85.9 for verbal aggression directed toward the male to a high of 99.7 for sexual misidentification. These data amply indicate that the scoring rules for analysis are reliable as compared to acceptable standards in the research literature.

In order to check on all factors which might conceivably affect the tested relationships, personnel data characteristics were compared according to quartile distribution. With the exception of rank and combat time in the fourth quartile, there were no outstanding factors which affected the results in one direction or the other. In the former instance, one would expect a larger number of sergeants with more time in service. In the latter, the minimal period spent in a relatively quiet period of combat one year from the time of testing should have little influence on the experimental results.

Another pertinent factor that was taken into consideration was the time spent by the enlisted man in his individual unit. Thus, a soldier's emotional status may be conceivably affected by the duration of opportunity to identify with the group. However, though not statistically verified, the personnel policy in effect at the time of examination was one in which a man remained in his unit until rotated to the zone of the interior.

In reference to the statistical methodology involved, the total group was first broken down into four subgroups. The first quar-

tile represents the men who had completed up to 25 percent of their tours in Korea, whereas the fourth quartile represents the men who completed 75 percent or more of their present duty assignments. The average frequency score was then tabulated for each variable within the subgroup. This score was translated into a percent of the theoretical maximum score. Chi squares were applied to all measurements, with the exception of constriction and the psychosomatic check-list score. In these two latter cases, because total mean scores were utilized, a standard error measurement of the difference was applied as an index of statistical significance. The five percent level of significance was adopted in all cases.

### RESULTS

Although the principal finding, as shown by table 2, is that there is no significant association between the variables tested and length of tour in Korea, some exceptions can be noted. In the case of the variable, aggression, the scores of the fourth quartile are significantly different from those of the second. On

TABLE 2. Percent of frequency scores by quartile distributions for 191 U. S. soldiers\*

Variables	Quartiles (percent of tour completed)			
	1	2	3	4
<b>Thematic Apperception Test</b>				
Physical aggression	19	18	21	22
Nondirected	4	5	5	4
Against male	8	9	10	11
Against female	5	4 <sup>1</sup>	5	8
Against male and female	2	0	0	0
Verbal aggression	8	6 <sup>1</sup>	8	10
Nondirected	2	11	2	1
Against male	2	2	2	3
Against female	1	1	1	3
Against male and female	2	1	1	3
Total aggression	27	24 <sup>1</sup>	29	32
Affiliation	32	34 <sup>2</sup>	29	27
Abasement	19	19	22	21
Escape	21	18	17	18
Sexual misadventure	8	5	7	7
Constriction**	444	479	515	473
Psychosomatic index**	8.4	7.9	8.3	7.7

\*Percent of the theoretical obtainable maximum score.

\*\*Values tabulated by means

1=2 quartile significantly less than 4 quartile.

2=2 quartile significantly greater than 4 quartile.

further inspection of this particular factor, the verbal medium of expression, in contrast to the physical variable, seems to maintain this relationship. However, the importance of physical aggression directed toward female objects as a significant component of this relationship is also evident. In contrast to the above, the variable of affiliation reaches its peak at the second quartile and is significantly different from its low at the fourth.

### DISCUSSION

The major finding of this study is that there is no association between the majority of variables tested and length of tour in Korea. Thus, such factors as sexual identification, escape tendencies, abasement, and constriction, as well as psychosomatic complaints, remain relatively constant throughout the enlisted man's tour in Korea. Seemingly, therefore, one could infer a reasonable degree of resiliency in the U. S. soldier in warding off the emotional hazards of field duty in Korea.

Some exceptions to the above statement should be noted. The results seemed to indicate that as the soldier approaches the end of his tour in Korea, aggressive impulses become very much a part of his personality make-up when compared with his earlier adjustment. On the other hand, his need to draw close to a person, to feel companionship and friendship, becomes significantly lessened as the tour progresses. It may be hypothesized that the frustrations of overseas duties under field conditions that entail separation from home, family, and security have contributed to a reactive type of hostility and a withdrawal from social interaction. The importance of the female component as a focus for the hostility also seems to indicate an unconscious reaction to the prolonged separation from a normal heterosexual relationship.

Apparently these emotional forces are at their low ebb during the second quarter of the soldier's tour, when he is girding himself for the long pull ahead and requires an identification with his fellow workers. It must be noted, however, that though these pressures and strains seem to exist, the data cannot ascertain the degree to which inner tension is converted into action. Finally, because there is no statistical difference between the third and second or fourth quartiles, though it is indeed an intermediate value between the two, these implications can be seen as being only suggestive.

### SUMMARY

One hundred and ninety-one U. S. soldiers from the 35th Infantry Regiment were administered a psychosomatic check list and the Thematic Apperception Test. Over-all personality characteristics, as measured by the experimental tools, did not seem to be markedly affected by the 16-month tour of duty. The factors



of sexual identification, abasement, escape tendencies, and constriction remained relatively constant. There was some suggestion, however, both of a general increase in the soldier's aggressive impulses and of a decrease in affiliation needs as the tour progressed.

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#### PROBLEMS IN THE SERVICES

Men who are dependent and feel emotionally insecure are placed under severe conflictual stress if their wives verbalize dissatisfaction with Army life and suggest that their husbands terminate a career in which the men have made a large investment of time and have established good efficiency records.

Older men who are assigned markedly new duties for the first time in an overseas command and are required to adapt to an entirely new unit as individual replacements, while separated from their families, are likely to develop anxiety.

—FREDERICK A. ZEHRER, Lt. Col., MC, USA  
in *Medical Bulletin of the U. S. Army*,  
Europe, p. 49, Feb. 1956

## Late Complication of the Whipple Operation

## Carcinoma of the Duct of Wirsung With Four-Year Survival

EDWARD J. FADELL, *Major, MC, USA*MAURICE TULIN, *Major, MC, USA*

**R**ADICAL pancreaticoduodenectomy for tumors in and about the head of the pancreas has fallen somewhat into disrepute in recent years. Of the problems arising from this procedure, two have received considerable attention: (1) the proper method for securing internal biliary tract drainage, and (2) whether the pancreatic stump should be closed or whether some form of pancreatico-enteric anastomosis should be attempted.<sup>1</sup>

We recently performed an autopsy on a previously reported case.<sup>2</sup> This report described an unusual tumor, a papillary adenocarcinoma of the duct of Wirsung which presented as a lemon-sized mass lying in the third portion of the duodenum and which was attached by a stalk to a point of origin in the terminal centimeter of the main pancreatic duct. No ampulla of Vater was present; the common bile duct and each pancreatic duct opened separately into the duodenum. The authors stated that they had been unable to find a report of a similar case in the literature. A pancreaticoduodenectomy was performed with direct biliary tract drainage by means of a choledochojejunostomy. The pancreatic stump was ligated and buried in the retroperitoneal tissues.

Because of the striking autopsy findings and also because of the rarity of the original tumor, we wish to report this follow-up.

## CASE REPORT

**History.** This 58-year-old man was admitted to this hospital on 26 May 1954 with a diagnosis of carcinoma. Starting in 1945 he had recurrent episodes of jaundice, chills, and fever. An exploratory laparotomy was performed in 1948, and the gall bladder was removed. A common duct was found dilated at that time. No stones were present. The patient continued to have recurrent episodes of jaundice, chills, and fever, and re-exploration was done 1 December 1950. At that time a papillary adenocarcinoma of the distal 1 cm of the main pancreatic duct was demonstrated. It was connected to this primary site by a small pedicle, but the main portion of the tumor was a 5- by 6-cm mass in the

From Letterman Army Hospital, San Francisco, Calif.

duodenum. A modified Whipple operation was accomplished with removal of two thirds of the stomach, all of the duodenum, and the greater portion of the pancreas. The proximal end of the jejunum was closed and the common bile duct was anastomosed to it through a stab wound. A portion of the small intestine was anastomosed to the remaining portion of the stomach. The remaining portion of the pancreas was ligated and buried in the retroperitoneal tissue. The patient had a stormy post-operative course, during which time the pancreatic ferments drained through the anterior abdominal wall for a period of six months. Following discharge, the patient did fairly well until May 1954. At that time he began to have episodes of chills and fever. His appetite became very poor, and he was admitted to a local hospital, with transfer to this hospital on 26 May 1954.

**Physiologic Examination.** Physical examination on admission to this hospital revealed a chronically ill, cachectic white male, who appeared *in extremis*. Blood pressure was 70/40 mm Hg; pulse, 100 and regular. The chest was clear to auscultation and percussion. There was an indistinct, hard, diffuse, palpable mass in the upper part of the abdomen below the previous operative scars. The liver, palpable three to four fingersbreadth below the right costal margin, was moderately firm and tender. There was pigmentation of the skin; at the time of initial examination, it was not definite if this was jaundice.

**Laboratory Data.** Admission white blood cell count was 18,800 per  $\mu$ l with 95 per cent neutrophils, 30 of which were nonsegmented. The hemoglobin was 9.7 g/100 ml. Urinalyses were essentially negative. Serum bilirubin on admission was 2.1 mg (direct) and 3.6 mg (indirect) per 100 ml; four days later it was 2.4 (direct) and 4.6 (indirect). The serum bilirubin was not measured again but jaundice increased rapidly following these estimations. The serum amylase was 34 Somogyi units per 100 ml, and the serum lipase was 35 tributyrin units. The glucose, chlorides, sodium, potassium, and calcium levels were all within normal limits. The nonprotein nitrogen was 35 mg per 100 ml. The thymol turbidity was 19 units; thymol flocculation, 2 plus; zinc sulfate turbidity, 24; and cephalin-cholesterol flocculation, 3 plus in 24 hours and 3 plus in 48 hours. Two blood cultures were positive for *Escherichia coli*, which was sensitive to Aureomycin (brand of chlortetracycline hydrochloride). The clinical impression was metastatic carcinoma of the liver.

**Clinical Course.** On admission the patient was placed on a select diet, multiple small feedings between meals, 1 ml of vitamin B complex given intramuscularly daily, 360 mg (600,000 units) of penicillin twice a day, 1,000 ml of whole blood, 25 g of serum albumin, 50 mg of cortisone every 6 hours, and 25 mg of testosterone propionate intramuscularly twice weekly. Pancreatin after each meal was given. At first the patient improved slightly but spiked a temperature of about 102°F every second or third day. He then followed a gradual downhill course. Fever

was continuous and the jaundice increased greatly. Tube and intravenous feedings were resorted to without any improvement. The patient died on the morning of 10 June 1954.

### Autopsy Findings

*Gross examination.* Examination of the body at autopsy showed a markedly jaundiced adult male who was well developed but poorly nourished. Upon opening the abdomen, an antecolic anastomosis was present between the proximal jejunum and the free border of the stomach. The pancreatic stump was buried in the retroperitoneal tissues. A choledochojejunostomy was present. Dissection of the anastomosis of the jejunum to the common bile duct revealed a large, mixed, pigmented stone measuring approximately 4 by 3 by 2 cm blocking the common duct. The liver weighed 2,000 grams. Sectioning throughout the liver revealed scattered nodularity due to abscesses. Green purulent fluid could be expressed. A pronounced nutmeg appearance was evident. The lungs showed numerous infarcts.

*Microscopic examination.* Microscopically the liver showed pronounced centrilobular necrosis. In many of the portal areas, abscesses (fig. 1) were present with a surrounding proliferation of granulation



Figure 1. Portal abscess. ( $\times 32$ )

tissue. In some portal areas a moderate proliferation of rather dense, mature, fibrous connective tissue was seen, together with a prolifer-



Figure 2. Portal fibrosis. ( $\times 100$ )



Figure 3. Liver. Dilated interlobular bile duct containing bile, debris, and leukocytes. ( $\times 475$ )

ation of small bile ducts (fig. 2). Occasional bile ducts contained bile, debris, and leukocytes (fig. 3). Only occasional canaliculi contained bile thrombi. The pancreas revealed a pronounced loss of acinar tissue, with only islands remaining in the small portion of the pancreas left behind at the previous operation (fig. 4). There was no evidence of residual adenocarcinoma. The lungs showed areas of infarction, together with evident lobular bronchopneumonia.

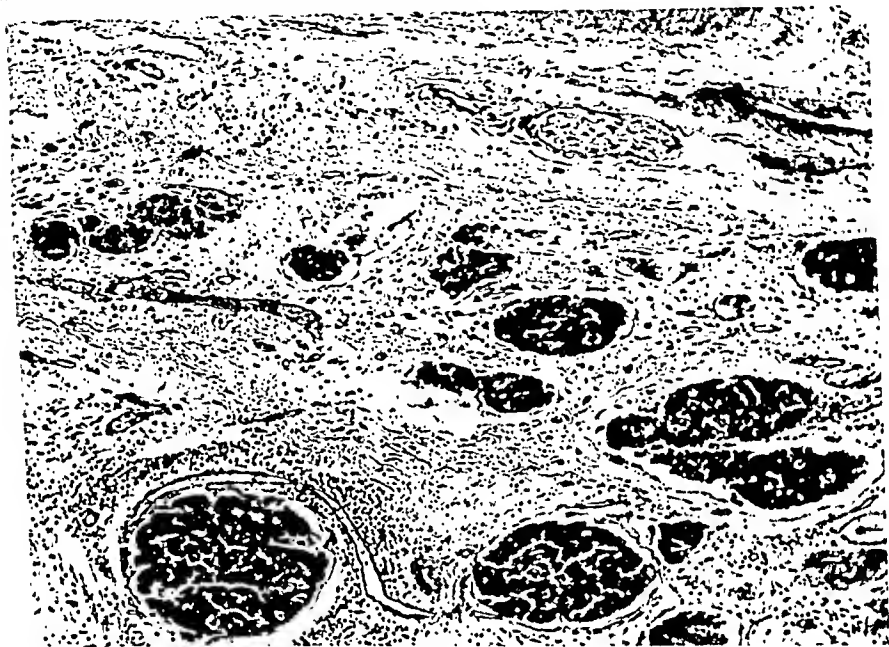


Figure 4. Pancreas. Residual island tissue and loss of acinar structures. ( $\times 100$ )

**Final anatomic diagnoses were:**

1. Pancreatectomy, partial
2. Choledochojejunostomy
3. Choledocholithiasis with obstruction of the common bile duct
4. Abscesses, liver (secondary to ascending cholangitis)
5. Portal fibrosis (biliary cirrhosis, inactive), moderate, liver

**DISCUSSION**

Although the specimen resected at the operation contained tumor-infiltrated pancreas, duodenum, and lymph nodes, diligent search at autopsy revealed no tumor. A three and one-half year cure of cancer was, therefore, achieved.

A significant point of this case concerns a complication of the Whipple procedure; namely, calculus formation with cholangitis and consequent hepatic abscesses. Child and Ellis<sup>1</sup> described a similar complication in some of the few cases which were followed to autopsy after the Whipple procedure. Although the long-

followed cases are few, there is some degree of uniformity about the complications which suggests that the procedure, both as regards failure of eradication of the majority of cancers for which it is performed and the serious postoperative complications, may not be justified.

### SUMMARY

The final autopsy report on a previously reported case of adenocarcinoma of the duct of Wirsung is submitted. Death occurred three and one-half years after removal of the tumor by a Whipple operation.

The terminal illness lasted approximately a month and consisted of anorexia; intermittent, remittent fever; increasing jaundice; evidence of moderate parenchymal hepatitis; and *Esch. coli* septicemia.

At autopsy, a large common duct stone and multiple hepatic abscesses were demonstrated. No evidence of residual tumor could be discovered. The report illustrates the probable cure of a pancreatic carcinoma and also the complications of the Whipple procedure.

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### THE PROBLEMS OF A PHYSICIAN

"The young doctor may be disconcerted, on his entry into the professional world, to find malingerers among his patients. But he will find them. He will find hysterical patients, and gentle, amiable men and women who cultivate their neuroses as carefully as roses and cucumbers are cultivated for a horticultural show. And how is he to deal with them? The textbooks supply only part of the answer, and to complete it he must use moral courage: moral courage and perhaps ingenuity."

—ERIC LINKLATER  
in *British Medical Journal*  
p. 1519, Dec. 24, 1955





freeing the nerve from adhesions or by completely resecting the nerve. In some cases there were evidently dense adhesions, in others only "filmy hands." In 1913 Magee<sup>4</sup> reviewed his cases of genitofemoral causalgia and analyzed six cases in which resection of the nerve and freeing of adhesions was the only form of therapy employed. The chief features presented by these patients were: (1) pain centered in the region of the internal abdominal ring; (2) tenderness on pressure over this area and the inguinal canal; (3) hyperesthesia over the distribution of the genitofemoral nerve; and (4) pain on hyperextension of the thigh.

Magee<sup>4</sup> stressed the fact that freeing the nerve from adhesions may give only temporary relief and that resection of the nerve is the only assurance of permanent cure. The condition is much more common in males, is usually right-sided, and frequently follows appendectomy, although the type of incision used in the appendectomy is apparently not related per se to the occurrence of this syndrome. In his report Magee<sup>4</sup> stressed the clinical manifestations of genitofemoral causalgia, but stated that "pathological study of the nerves removed shows normal nerve or slight interstitial fibrosis but no careful study of this aspect has been made." In 1945 Lyon<sup>5</sup> reported three patients with genitofemoral causalgia who were completely relieved by resection of the genitofemoral nerve. In one of these cases a microscopic examination of the involved nerve showed intraneural fibrosis and patchy demyelination. Lyon stated that in none of his cases were adhesions particularly dense but in all three cases that he described the nerves were "quite taut," and he goes on to state that he was unable to demonstrate this degree of tension in the nerves of normal individuals not complaining of this syndrome who were examined at laparotomy for other conditions.

The sensory nerves that supply the inguinogenital region are the anterior cutaneous branches of the iliohypogastric nerve, the ilio-inguinal nerve, and the external spermatic branch of the genitofemoral nerve. Since the latter two appear to have been involved in the case herein presented, a brief description of their anatomy is warranted.

The ilio-inguinal nerve arises from the first lumbar nerve, emerges from the upper part of the lateral border of the psoas major, and crosses obliquely in front of the quadratus lumborum and the iliacus. It perforates the transversus abdominis near the anterior part of the iliac crest, then pierces the obliquus internus abdominis, accompanies the spermatic cord through the external inguinal ring, and is distributed to the skin of the upper and medial part of the thigh and to the skin over either the root of the penis and upper part of the scrotum in the male or the mons pubis and labium majus in the female. The genitofemoral nerve arises

from the first and second lumbar nerves. After passing obliquely through the substance of the psoas major, it emerges from its medial border, descends on the surface of the psoas major under the peritoneum, and divides into the external spermatic and lumbinguinal nerves, although occasionally these two nerves emerge separately through the substance of the psoas. The external spermatic nerve passes outward on the psoas major, and pierces the transversalis fascia or passes through the internal inguinal ring; it then descends behind the spermatic cord to supply the cremaster and the skin of the scrotum.

### CASE REPORT

A 33-year-old married pilot was transferred from an arctic air base because of persistent severe pain in the region of the right groin and the right testicle. The referring diagnosis was "probable calculus in the right ureter."

The history obtained from the patient is that the initial onset of his present illness occurred on 31 December 1953 when he was seized with right flank pain, radiating down to the right groin and right testicle. He received no relief from Novocain (brand of procaine hydrochloride) injections into the back muscles or from diathermy treatments, and an intravenous pyelogram performed on 2 January 1954 revealed no abnormalities of the upper urinary tracts. Following this, the patient stated, he was "packed in ice" for two days with some relief of his complaints and then put at rest in his quarters for a period of three weeks. Subsequently, he suffered from recurrent, severe, aching sensations in the region of the right testicle and occasional right-sided groin pains, more pronounced toward the end of the day; the scrotal pain was aggravated when the patient sat with his legs crossed. He went on 30 days' leave in November 1954, and on three separate occasions he noted severe right testicular pain which commenced during intercourse with his wife, so much so that he made no further attempts at coitus. A 200-mile bus ride on 18 December resulted in his having severe back pain that night. Prior to this time the patient had had no urinary symptoms. There was no urethral discharge, chills, fever, nausea, or vomiting. On questioning, he stated that straining at stool occasionally would cause right testicular pain. He continued to complain of pain in the region of the right testicle and groin and was referred to this hospital for further urologic evaluation and treatment. His past history was significant only in that he had an appendectomy for a ruptured appendix in 1936, at which time he was hospitalized for a period of 32 days.

Physical examination on admission to this hospital on 1 March 1955 revealed the patient to be lying flat in bed in moderate distress complaining of pain in the right testicle. He was alert and co-operative; his abdomen was flat and soft. The liver, spleen, and kidneys were not palpable. There was no costovertebral-angle tenderness. There was slight tenderness to pressure in the right inguinal region, but no hernia

or lymphadenopathy was detectable in the recumbent or upright positions. There were no skin changes in the area of the right groin. He had an irregular right rectus appendectomy scar which was well healed. Examination of the genitalia revealed a normal male complement with circumcised penis. The left testis, epididymis, and spermatic cord felt normal and were not sensitive to mild pressure. The right testis, epididymis, and cord felt normal, but there was tenderness to light pressure over the testis anteriorly and in the region of the epididymis. There was no induration or enlargement of the epididymis. On rectal examination, the prostate gland was felt to be enlarged 1 plus, symmetrical, somewhat boggy, and extremely tender to touch. Pressure on the prostate gland produced rather sharp pains deep in the perineum and in the suprapubic region. The seminal vesicles were not palpable or tender.

Prostatic massage, which was very painful to the patient, produced a thick, white mucoid discharge which on microscopic examination revealed only an occasional pus cell and a few gram-positive cocci. A postmassage, voided urine specimen was essentially normal with a scant amorphous sediment and an occasional white blood cell. The prostatic culture grew *Micrococcus pyogenes* var. *aureus* and *Streptococcus viridans*, sensitive to bacitracin and dihydrostreptomycin and faintly sensitive to Chloromycetin (brand of chloramphenicol), but resistant to Terramycin (brand of oxytetracycline), Aureomycin (brand of chlortetracycline hydrochloride), penicillin, and polymyxin. The voided urine culture grew the same organisms with the same sensitivities. Admission diagnosis was exacerbation of chronic nongonococcal prostatitis. Complete blood count was unremarkable and the sedimentation rate was 6 mm per hour. An intravenous pyelogram revealed normal upper urinary tract function and architecture bilaterally with no evidence of obstruction.

The patient was confined to bed and given Sitz baths and 100 mg of Furadantin (brand of nitrofurantoin) four times a day. He improved slightly on this regimen but after a week of hospitalization again complained of severe pain in the right groin. Examination revealed no objective signs of inflammation in the area. There was no fullness in the groin; the right scrotal contents appeared and felt normal, although they were tender to touch. These complaints continued and another prostatic massage was performed on 13 March without relief. On 17 March there was still no change in his complaints of persistent right groin pain. This pain apparently was precipitated or aggravated by standing, walking, or lifting, was of a burning nature, and seemed to originate in the groin and travel down into the scrotum. By this time he had had an adequate course of Furadantin (100 mg 4 times daily for 13 days) and streptomycin sulfate (1 gram daily for 10 days).

At this point it was felt that the patient's complaints, if due to a low-grade prostatitis, should have completely cleared up on this regi-



arising from the tenth dorsal to the third sacral segments. The groin and genitalia are commonly involved by prostatic referred pain, and the physician is likely to indict the prostate as causing the pain, especially when the prostatic gland is boggy or enlarged. In this case, the symptoms persisted in spite of adequate therapy for the prostatitis, and it was only then that our attention was drawn to the true diagnosis. The incidence of chronic prostatitis is high, especially in the military, and it is not unusual to have this disease concomitantly with other afflictions.

It is interesting to speculate on the importance of the past history of appendicitis as a causative factor in causalgia of the groin and genital region. On review of the literature we find that five out of seven of Magee's<sup>3,4</sup> cases and all three of Lyon's cases had previously had appendectomies. The relationship of this syndrome to previous appendectomy cannot be overlooked. It may be speculated that there is a perineural fibrosis involving the ilio-inguinal nerve in the region of the scar, but in our case we found no dense adhesions around the resected nerves, and the pathologist noted no anatomic changes. Possibly in some of the reported cases the appendix may have been removed because of a mistaken diagnosis when the causalgia was actually producing the pain.

It is hoped that, by reporting this case, attention can once again be drawn to this syndrome which, to the best of our knowledge, has been overlooked in the American literature.

### SUMMARY

A review of the literature on causalgia of the ilio-inguinal and genitofemoral nerves is presented. An illustrative case report of an individual who was completely cured by section of these nerves high in the inguinal region is included. It is hoped that this report will stimulate consideration of this syndrome in the differential diagnosis of inguinal and genital pain.

### REFERENCES

1. Mitchell, S. W.; Mosehouse, G. R.; and Keen, F. W.: *Gunsbot Wounds and Other Injuries of Nerves*. J. B. Lippincott Co., Philadelphia, Pa., 1864.
2. Wan, F. E.: Sympathetic causalgia; report of 20 cases treated by sympathectomy. *Chinese M. J.* 61: 1-13, 1946.
3. Magee, R. K.: Genitofemoral causalgia (new syndrome). *Canad. M. A. J.* 46: 326-329, Apr. 1942.
4. Magee, R. K.: Genitofemoral causalgia. *Bull. Acad. Med., Toronto* 16: 105-111, Feb. 1943.
5. Lyon, E. K.: Genitofemoral causalgia. *Canad. M. A. J.* 53: 213, Sept. 1945.

### A MESSAGE FROM THE A. M. A.

Did you know the American Medical Association has a Bureau of Investigation? If so, are you familiar with its purpose and functions? To better acquaint military physicians with the activities of the A. M. A., the message this month is devoted to an answer of these questions.

The primary purpose of the A. M. A. Bureau of Investigation is the collection and dissemination of information on "patent medicines," quacks, medical fads and various other phases of pseudo-medicine. Since 1906 the Bureau, one of the educational activities of the Association, has served as a clearing house for information on the subjects with which it deals.

In the earliest days, the Bureau of Investigation was known as the Propaganda Department. Expository articles published in the A. M. A. Journal were compiled for the first time in 1912 and became the first volume of *Nostrums and Quackery*. A companion publication, devoted also to drugs promoted to the medical profession, called, "Propaganda for Reform," was published in 1917 by the Council on Pharmacy and Chemistry. It utilized many Bureau reports. The second volume of *Nostrums and Quackery* was published in 1921, and Volume Three appeared in 1936.

As one can well imagine, the reports of the Bureau were not popular with those immediately affected thereby. Naturally, a good many uncomplimentary things were said. As a result, no less than 42 law suits were filed against the Association for libel. The sums claimed as damages totaled over \$24,000,000. A good many of these cases were perhaps filed only for publicity purposes, and were never tried. A few, however, were fought to the conclusion, and the Association was successful in every instance except one. A Bureau report had mentioned the fact that the promoter of an alcoholic "tonic" on weekdays was a pillar of the church, preaching temperance on Sundays, and the jury felt that this was perhaps a little too harsh on the man and awarded him the sum of one cent. In other notable cases the Bureau accused widely known figures of being quacks and then proceeded to prove the characterization.

Information on over-the-counter medicines and such related subjects as devices, food faddists, cultists, and quacks is available to physicians, their patients, students and educators, government agencies, and civic groups. Federal, state, and munic-

From the Council on National Defense of the American Medical Association. The views and opinions expressed are not necessarily those of the Department of Defense.  
—Editor.

arising from the tenth dorsal to the third sacral segments. The groin and genitalia are commonly involved by prostatic referred pain, and the physician is likely to indict the prostate as causing the pain, especially when the prostate gland is boggy or enlarged. In this case, the symptoms persisted in spite of adequate therapy for the prostatitis, and it was only then that our attention was drawn to the true diagnosis. The incidence of chronic prostatitis is high, especially in the military, and it is not unusual to have this disease concomitantly with other afflictions.

It is interesting to speculate on the importance of the past history of appendicitis as a causative factor in causalgia of the groin and genital region. On review of the literature we find that five out of seven of Magee's<sup>1,2</sup> cases and all three of Lyon's cases had previously had appendectomies. The relationship of this syndrome to previous appendectomy cannot be overlooked. It may be speculated that there is a perineural fibrosis involving the ilio-inguinal nerve in the region of the scar, but in our case we found no dense adhesions around the resected nerves, and the pathologist noted no anatomic changes. Possibly in some of the reported cases the appendix may have been removed because of a mistaken diagnosis when the causalgia was actually producing the pain.

It is hoped that, by reporting this case, attention can once again be drawn to this syndrome which, to the best of our knowledge, has been overlooked in the American literature.

### SUMMARY

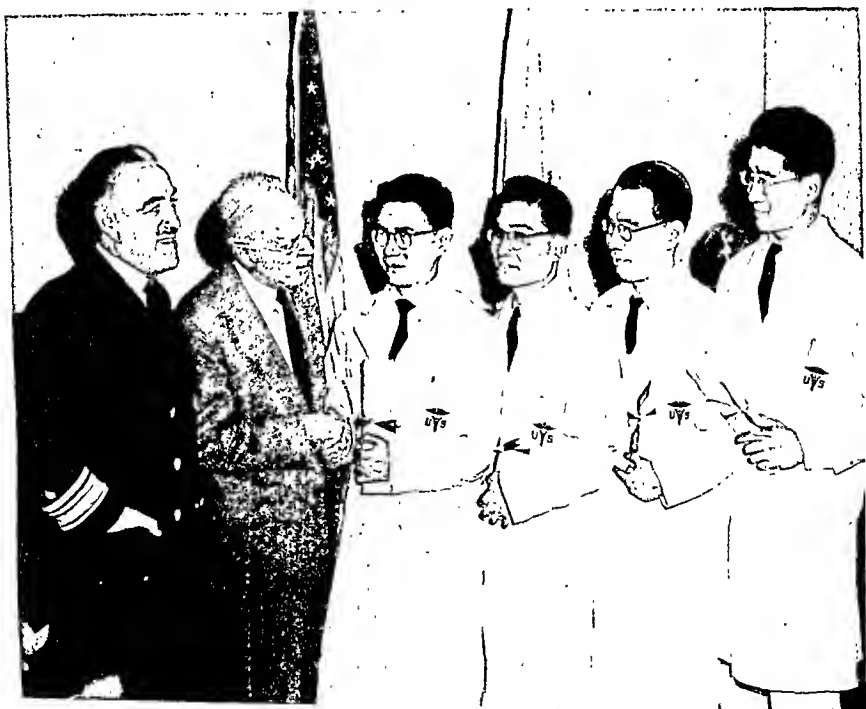
A review of the literature on causalgia of the ilio-inguinal and genitofemoral nerves is presented. An illustrative case report of an individual who was completely cured by section of these nerves high in the inguinal region is included. It is hoped that this report will stimulate consideration of this syndrome in the differential diagnosis of inguinal and genital pain.

### REFERENCES

1. Mitchell, S. W.; Morehouse, G. R.; and Keen, W. W.: *Gunshot Wounds and Other Injuries of Nerves*. J. B. Lippincott Co., Philadelphia, Pa., 1854.
2. Tan, F. E.: Sympathetic causalgia; report of 20 cases treated by sympathectomy. *Chinese M. J.* 61: 1-13, 1946.
3. Magee, R. K.: Genitofemoral causalgia (new syndrome). *Canad. M. A. J.* 46: 326-329, Apr. 1942.
4. Magee, R. K.: Genitofemoral causalgia. *Bull. Acad. Med., Toronto* 16: 105-111, Feb. 1943.
5. Lyon, E. K.: Genitofemoral causalgia. *Canad. M. A. J.* 53: 213, Sept. 1945.

## FAMOUS SPECIALIST AND SURGEON GENERAL OF NAVY VISIT WEST PACIFIC

Rear Admiral Bartholomew W. Hogan, MC, USN, Surgeon General of the Navy, and Dr. Paul Dudley White, consulting physician to President Eisenhower, made a tour of naval medical facilities in the Pacific, returning to the United States late in April. Other members of the party included Captain Walter Welham, MC, USN, Staff Medical Officer, Commander Submarine Forces Pacific, and Captain Leona Jackson, NC, USN, Director of the Navy Nurse Corps. Captain Charles W. Stelle, MC, USN, Staff Medical Officer, Commander Naval Forces Far East, accompanied the group during visits to activities in that command.



*Dr. Paul Dudley White and Rear Admiral Bartholomew W. Hogan congratulate four Japanese doctors on having successfully completed a one-year internship at the U. S. Naval Hospital, Yokosuka, Japan. The interns are, from left to right, Dr. Yutaka Katoh, Dr. Noboru Tokumaru, Dr. Yooichiro Yanagita, and Dr. Kooichi Fujii. Drs. Katoh, Yanagita, and Fujii will continue their training in Maryland, Johns Hopkins, and Washington University hospitals respectively, beginning in June or July.*



ipal health officials, physicians, and others interested in public health often refer inquiries to the Bureau. In preparing news and feature stories, newspapers and magazines frequently rely upon information in Bureau files.

Information is collected by the Bureau from several sources. Original investigations, often supplemented by analytical work done in the A. M. A. Chemical Laboratory, are carried on. Data are received from federal sources such as the Food and Drug Administration, National Institutes of Health, Post Office Department, and Federal Trade Commission, as well as from state licensing boards and state and municipal boards of health. Information also is gleaned from reports in domestic and foreign technical journals and from reports of special committees. Doctors of medicine and local and state medical societies are valuable sources of information.

Thousands of inquiries are received by the Bureau each year. The Bureau transmits its information mainly through replies to these letters. Articles are prepared by the Bureau for the *Journal of the American Medical Association* and for *Today's Health*, which may later be reprinted with permission in pamphlets and books. A physician in need of material for lectures on quacks and nostrums may wish to contact the Bureau.

Although in past years the Bureau published a number of books and pamphlets on nostrums and quackery, the passage of the 1938 Federal Food, Drug, and Cosmetic Act requiring the accurate labeling of drugs has reduced the need for these publications. Reprints on many of these subjects still are available.

In addition to its principal function of furnishing what information it has in its files on specific request, the personnel of the Bureau spends a good deal of time and effort in the exposure of medical impostors. There have been times when rather clever individuals have posed as doctors under circumstances which provided a real challenge, born either of their ingenuity or their influence in certain circles. In one case an extraordinary amount of effort over a period of about four years resulted in the exposure and "unfrocking" of a man who had posed as a Doctor of Medicine in a southwestern state for 20 years.

The Bureau has available to medical groups and educators lantern slides and a film strip on nostrums and quackery. Many newspapers and magazines call on the Bureau for information regarding advertising. The National Better Business Bureau and affiliated local Better Business Bureaus are in close co-operation with the A. M. A. Bureau. Large business organizations sometimes call on the Bureau for information on medical devices and products which may be offered to their employees.

# REGULAR MEDICAL CORPS OFFICERS CERTIFIED BY SPECIALTY BOARDS

## Supplementary Listing

According to current information from the Offices of the Surgeons General of the three military medical services, the following 329 officers have been certified by the boards indicated, since the listings published in successive issues of this *Journal* from October 1953 to April 1955.

### The American Board of Otolaryngology

James P. Albrite, Maj., USA	Bernard J. Moore, Lt. Col., USA
Stanley H. Bear, Maj., USAF	Francis J. Peisel, Maj., USA
Aubrey K. Brown, Lt. Col., USA	Charles H. Ransom, Lt. Col., USA
John J. Brown, Capt., USN	Cecil D. Riggs, Capt., USN
Lawson G. Cox, Maj., USA	Maurice Schiff, Comdt., USN
Joseph B. Dominey, Jr., Comdr., USN	Herbert P. Sube, Lt. Col., USA
Byron T. Eberly, Lt. Comdr., USN	George W. Taylor, Jr., Comdt., USN
William C. Livingood, Capt., USN	Gilbert A. Twitchell, Lt. Col., USAF
Gordon Marquis, Maj., USAF	

### The American Board of Ophthalmology

William R. Armsstrong, Lt. Col., USAF	Harold J. Louis, Maj., USAF
Virgil A. Beuerman, Capt., USN	Lemuel T. Mootman, Lt., USN
Charles O. Bruce, Jr., Maj., USA	Jack W. Passmore, Lt. Col., USA
Warren T. Culver, Maj., USAF	Charles O. Rixey, Lt. Col., USA
James L. Curris, Maj., USAF	Gerald J. Schwab, Maj., USA
James L. Fuelling, Capt., USN	Bland H. Schwarting, Maj., USAF
Robert Kelley, Col., USA	Eldon C. Swanson, Capt., USN
Theodore N. Kirkland, Jr., Lt. Comdr., USN	Lockland V. Tyler, Jr., Lt. Comdr., USN
George A. Levi, Maj., USA	Donald E. White, Maj., USAF
John W. Linfesty, Col., USAF	Norman B. Yourish, Maj., USA

### The American Board of Obstetrics and Gynecology

Sidney L. Arje, Capt., USN	James P. Moran, Capt., USN
Morris E. Brackerr, Lt. Col., USA	Woodrow L. Pickhardt, Lt. Col., USA
Rolan A. Christensen, Capt., USN	Stephen J. Rudolph, Jr., Maj., USAF
Robert B. Greenman, Capt., USN	Carlton W. Sargent, Lt. Col., USA
James C. Hodges, Jr., Comdr., USN	Albert K. Schoenbucher, Lt. Col., USA
Thomas B. Leberherz, Comdr., USN	John J. Young, Lt. Col., USA

### American Board of Dermatology and Syphilology

Gusrave T. Anderson, Comdr., USN	William K. Hall, Comdr., USN
John P. Briske, Maj., USA	James R. Hamilton, Lt. Comdr., USN
Kennerh H. Burdick, Capt., USAF	Louis E. Harman, Jr., Maj., USA
Earl R. Claiborne, Maj., USAF	Samuel H. Horton, Jr., Capt., USN
John J. Downey, Lt. USN	James H. Lockwood, Capt., USN

The trip covered installations in Japan, Okinawa, Formosa, the Philippines, the Marianas, Kwajalein, and the Hawaiian Islands. Dr. White spent several days at the Cardiology Research Unit in Fukuoka, Japan, which he is directing with Dr. Ancil Keyes, and spoke on cardiac diseases at a number of symposia and meetings for medical officers of our Armed Forces. He also consulted on many patients in military hospitals and dispensaries. In Manila, Admiral Hogan and Doctor White attended sessions concerned with the establishment of an Asian-Pacific Congress of Cardiology, in which Dr. White was greatly interested.



*A friendly interlude during the survey of medical conditions and requirements on Saipan, Mariana Islands.*

Admiral Hogan conferred with senior naval commanders and interviewed many busy medical officers at the activities that he visited, placing special emphasis on making the best possible use of the time of valuable doctors, who are in such short supply. Medical, dental, and nursing activities were observed throughout the trip and conferences were held on problems related to patient care and medical logistics. Particular attention was given to the feasibility and reasonableness of making consolidations without causing reduction of the highest standard of patient care.

### American Board of Radiology—Continued

Robert C. Innes, Maj., USA  
 Russell B. Jauernig, Maj., USA  
 Robert S. Kibler, Comdr., USN  
 Elmer R. King, Capt., USN  
 John W. Koetr, Capt., USN  
 Robert J. Kurth, Maj., USAF  
 John M. McGuire, Maj., USA  
 John D. S. Morris, Maj., USA  
 Clifford R. Pollock, Maj., USAF

John R. L. Pracher, Lt. Col., USA  
 Robert H. Reid, Maj., USAF  
 Wilson R. Scott, Maj., USA  
 Fred W. Seymour, Col., USA  
 Paul E. Sieber, Lt. Col., USA  
 Donald W. Spicer, Lt. Comdr., USN  
 Fred E. Stull, Jr., Capt., USAF  
 Henry T. Uhrig, Capt., USA  
 Lorrain E. Waters, Jr., Comdr., USN

### American Board of Internal Medicine

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 George G. Burkley, Capt., USN  
 Vernon W. Campbell, Comdr., USN  
 Bruce L. Canaga, Jr., Capt., USN  
 Charles S. Christianson, Lt. Col., USA  
 Henry M. Cook, Jr., Lt. Col., USA  
 George M. Davis, Jr., Capt., USN  
 Paul D. Doolan, Lt. Comdr., USN  
 Richard Foulk, Comdr., USN  
 Samuel M. Fox, III, Lt. Comdr., USN  
 Martin J. Freedman, Maj., USAF  
 Robert J. Hall, Maj., USA  
 Ira B. Harrison, Lt. Col., USA  
 Jay C. Hoyt, Maj., USA  
 William H. Isham, Maj., USA  
 Donald C. Kent, Lt. Comdr., USN

Patrick I. McShane, Col., USA  
 William H. Meroney, III, Lt. Col., USA  
 Robert H. Moser, Maj., USA  
 Frank T. Norris, Capt., USN  
 Robert E. Nuernberger, Col., USAF  
 Edwin L. Overholt, Lt. Col., USA  
 Forrest W. Pitts, Maj., USA  
 Irvin C. Plough, Lt. Col., USA  
 Jacob J. Robbins, Comdr., USN  
 Ralph D. Ross, Comdr., USN  
 James H. Sands, Maj., USA  
 Jacques L. Sherman, Jr., Maj., USA  
 Richard R. Taylor, Maj., USA  
 Paul E. Teschan, Maj., USA  
 Bertram A. Weeks, Lt. Col., USA  
 Sidney G. White, Maj., USAF

### American Board of Pathology

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 Marcus R. Beck, Lt. Col., USA  
 Robert I. Bosman, Maj., USA  
 Murdock S. Bowman, Lt. Comdr., USN  
 Orro C. Brosius, Maj., USA  
 Charles P. Carson, Maj., USA  
 Robert F. Dillon, Maj., USA  
 Slarer M. Dozier, Lt. Col., USA  
 John H. Draheim, Maj., USA  
 James J. Humes, Lt., USN

Edward H. Johnston, Maj., USA  
 Augustus B. Jones, Jr., Lt. Col., USA  
 Stuart D. Kustermann, Lt. Comdr., USN  
 Arthur F. Lincoln, Lt. Col., USA  
 Joseph H. Masters, Maj., USA  
 Sarkis S. Sarkisian, Comdr., USN  
 Maurice R. Schmoyer, Jr., Comdr., USN  
 Daniel Stowens, Maj., USA  
 William A. Williams, Maj., USA

### American Board of Surgery

Eugene F. Bolliger, Maj., USA  
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 Donald Campbell, Lt. Col., USA  
 Joseph V. Conroy, Jr., Lt. Col., USA  
 Hugh P. Curtis, Maj., USA  
 George O. Detarnowsky, Capt., USN  
 Charles R. Downs, Maj., USA  
 Carl T. Dubuy, Col., USA  
 Francis E. Foley, Lt. Col., USAF  
 Marvin L. Gerber, Capt., USN  
 Charles E. Guice, Capt., USAF  
 Joseph R. Henry, Col., USAF  
 Raleigh M. Hood, Lt. Comdr., USN  
 Edward J. Jahnke, Jr., Maj., USA  
 Arthur J. Katzberg, Lt. Col., USAF

Romulus L. May, Comdr., USN  
 John A. Moncrief, Lt. Col., USA  
 William H. Moncrief, Jr., Lt. Col., USA  
 Phillip H. Philbin, Maj., USAF  
 Clinton A. Piper, Maj., USA  
 Charles C. Pixley, Maj., USA  
 Henry P. Rosack, Lt. Col., USA  
 Robert L. Rudolph, Maj., USAF  
 Richard L. Sedlacek, Maj., USAF  
 Richard C. Shrum, Lt. Col., USA  
 Edward P. Smith, Jr., Maj., USAF  
 Derrick Turnipseed, Capt., USN  
 George T. Van Petten, Comdr., USN  
 Thomas J. Whelan, Lt. Col., USA  
 Theodore H. Wilson, Jr., Lt. Comdr., USN

**American Board of Dermatology and Syphilology—Continued**

Samuel L. Moschella, Lt. Comdr., USN  
 Victor J. Slominski, Capt., USA  
 Darl E. Van der Ploeg, Maj., USA

Sanford M. Vaughan, Lt. Col., USA  
 Carl B. Weller, Lt. Col., USA

**American Board of Pediatrics**

Thaddeus W. Cap, Lt. Col., USA  
 Thomas B. Delaney, Lt. Comdr., USN  
 Robert C. Garner, Maj., USA  
 Frank W. Govers, Col., USA  
 Jerald P. Hough, Maj., USAF  
 Paul G. Hoveman, Lt. Comdr., USN  
 Herbert J. Jacobs, Maj., USA  
 Andrew M. Margileth, Lt. Comdr., USN  
 Delmer J. Pascoe, Lt. Comdr., USN

Earl R. Peters, Lt. Comdr., USN  
 Harvey O. Randel, Lt. Comdr., USN  
 William A. Robe, Comdr., USN  
 Peter W. Schneider, Lt. Comdr., USN  
 Frederic R. Simmons, Maj., USAF  
 Arthur G. Smith, Maj., USAF  
 Harry J. Umlauf, Lt. Col., USA  
 Charles L. Waite, Lt. Comdr., USN  
 Donald O. Ward, Lt. Comdr., USN

**American Board of Psychiatry and Neurology****Psychiatry and Neurology**

Jacob G. Hebble, III, Capt., USN  
 John E. Nardini, Capt., USN

Willard H. Pennell, Maj., USAF  
 Robert L. Williams, Maj., USAF

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 Robert A. Broadbush, Lt. Col., USA  
 Bruce L. Bushard, Lt. Col., USA  
 Ralph W. Clements, Lt. Col., USA  
 Martin Cooperman, Capt., USN  
 James J. Gibbs, Maj., USA  
 Paul W. Hayes, Lt. Col., USA

Theodore A. Kiersch, Lt. Col., USA  
 John C. Mahane, Maj., USAF  
 Ralph A. Muehich, Maj., USAF  
 Philip B. Phillips, Capt., USN  
 Gordon Savet, Maj., USAF  
 Dasil C. Smith, Maj., USAF  
 Louis J. West, Maj., USAF  
 Stanley E. Willis, II, Lt. Comdr., USN

**Neurology**

James F. Hammill, Lt. Col., USA

**American Board of Orthopaedic Surgery**

Earl W. Brannon, Lt. Col., USAF  
 Wayne D. Bundens, Jr., Comdr., USN  
 Thomas H. Crouch, Col., USAF  
 James R. Dienes, Comdr., USN  
 Desale G. Duvigneaud, Capt., USN  
 Warren D. Eddy, Jr., Lt. Col., USA  
 Thomas M. Foley, Jr., Capt., USN  
 Leroy F. Friend, Capt., USN  
 Edwin W. Hakala, Col., USA  
 George W. Hyatt, Comdr., USN  
 Robert B. Johnson, Capt., USN

Robert R. Kessler, Maj., USAF  
 Edwin J. Lindig, Maj., USA  
 Francis H. McCullough, Jr., Comdr., USN  
 Charles W. Metz, Lt. Col., USA  
 Elwin W. Midgley, Maj., USAF  
 St. Fried Moorehead, Jr., Maj., USAF  
 Francis D. O'Brien, Maj., USAF  
 Harry T. Stradford, Capt., USN  
 Harold A. Strein, Capt., USN  
 Leroy O. Travis, Lt. Col., USA

**American Board of Radiology**

Harry C. Alfred, Maj., USAF  
 Norman L. Atnett, Maj., USA  
 John R. Babb, Maj., USA  
 Joseph C. Bacon, Comdr., USN  
 Leonard J. Bisaccia, Lt. Col., USA  
 Loy T. Brown, Comdr., USN  
 Billy J. Carter, Maj., USAF  
 Elwyn Cavin, Maj., USA  
 Harry R. Claypool, Maj., USAF

Sam F. Crabtree, Maj., USAF  
 George H. Davis, Capt., USN  
 Robert A. Flaherty, Maj., USAF  
 Juan Gonzalez-Rodriguez, Lt. Col., USA  
 R. D. Gregory, Jr., Capt., USAF  
 Longstreet C. Hamilton, Lt. Col., USA  
 Henry C. Harrell, Col., USA  
 Genic L. Hekhuis, Lt. Col., USAF  
 Francis H. Holmes, Comdr., USN

# Promotions of Officers

The following officers of the military medical services on active duty in the Army, Navy, and Air Force have recently received temporary promotions to the rank indicated.

## MEDICAL CORPS

ACKERMAN, Raymond E., Lt., USN  
 AGGERUP, Glenn S., Lt., USN  
 ALSTET, Maynard H., Capt., USAF  
 ALSTON, Herman D., Jr., Capt., USAF  
 ALTSCHULER, Gerald, Capt., USAF  
 AMES, Berl, Lt., USN  
 ANGELES, Godofredo T., Lt. Col., USA  
 ANKENBRANDT, Joseph O., Lt., USN  
 ARKINS, Robert E., Lt., USN  
 ARTHUR, Gerald W., Lt., USN  
 ASHOR, Gilbert L., Lt., USN  
 ATCHESON, Robert J., Lt., USN  
 AVNER, Saul L., Col., USA  
 BAKER, Stewart L., Jr., Lt. Col., USA  
 BAKKE, Jens R., Lt., USN  
 BARNES, Letcher B., Lt., USN  
 BARR, William M., Lt., USN  
 BATH, Richard K., Lt., USN  
 BAUKOL, John L., Lt., USN  
 BAXTER, Donald L., Lt., USN  
 BECKER, George L., Jr., Lt., USN  
 BECKER, Martin S., Capt., USAF  
 BECKJORD, Philip R., Col., USA  
 BELLAS, Joseph J., Jr., Maj., USA  
 BERGMAN, Philip A., Col., USA  
 BERMAN, Gilbert M., Lt., USN  
 BEYER, James C., Maj., USA  
 BISSON, Bertrand P., Capt., USAF  
 BOOLUKOS, George P. N., Lt., USN  
 BOTTIGLIERI, Nicholas G., Maj., USA  
 BRIEN, James N., Jr., Lt. Col., USA  
 BRILL, Edward J., Lt., USN  
 BROWN, Buster F., Lt., USN  
 BROWN, Donald B., Capt., USAF  
 BUNN, Raymond C., Lt., USN  
 BURNS, Richard O., Jr., Lt., USN  
 BURNSIDE, Wade W., Lt., USN  
 BYNUM, William L., Jr., Capt., USAF  
 BYRD, William G., Capt., USAF  
 CAHILL, Thomas J., Capt., USAF  
 CALDWELL, William T., III, Lt., USN  
 CAMPBELL, Emmett E., Jr., Capt., USAF  
 CAPLES, Joseph T., Col., USA  
 CAPOBIANCO, Anthony G., Capt., USAF  
 CARNAHAN, Lloyd G., Lt., USN  
 CARNES, William H., Jr., Lt., USN  
 CARSON, Charles P., Maj., USA  
 CARTER, Edwin L., Lt., USN  
 CAVENDER, Savino W., Col., USA  
 CHERRY, Arthur C., Capt., USAF  
 CHESLOCK, William B., Lt., USN  
 CLARK, George A., Capt., USAF  
 CLEMENTS, Ralph W., Lt. Col., USA  
 CLEMONS, Jack K., Lt., USN  
 COCHRAN, James R., Lt., USN  
 COLACHIS, Sam C., Jr., Lt., USN  
 COLLINGS, Harold, Jr., Maj., USA  
 COMPTON, Martin A., Col., USA  
 COOKE, Stanford B., Lt., USN  
 COCKSEY, Norton J., Lt., USN  
 COOPER, Merrill M., Lt., USN  
 COWAN, Leon K., Lt., USN  
 CRAMER, Earl H., Capt., USAF  
 CREISS, Frank C., Jr., Lt., USN  
 DELOZIER, Joseph B., Capt., USAF  
 DEVORE, Robert N., Lt., USN  
 DICKINSON, Selden J., Lt., USN  
 DIEFENDORF, Donald C., Lt., USN  
 DONLEY, Michael E., Lt., USN  
 DONOVAN, James F., Lt. Col., USA  
 DOYLE, John H., Capt., USAF  
 DUNCKEL, William C., Maj., USA  
 DURFEY, John Q., Lt., USN  
 DYETT, Benjamin I., Lt., USN  
 EDBERG, Sanford H., Lt., USN  
 EGLIN, James M., Jr., Lt., USN  
 ELLIS, Loander T., Jr., Lt., USN  
 ENGLER, Robert S., Lt., USN  
 ESENAT, Jose R., Capt., USAF  
 ESKRIDGE, Jack, Maj., USA  
 ESPENAN, Pierre A., Lt., USN  
 FAIGLE, John F., Capt., USAF  
 FALLS, Richard A., Lt., USN  
 FELIX, Arthur, Capt., USAF  
 FESKE, Victor H., Jr., Lt., USN  
 FEUERBACH, Frederick J., Lt., USN  
 FIANDACA, Patsy M., Jr., Lt. Col., USA  
 FINDLAY, Prent E., III, Lt., USN  
 FISHER, Morris, Lt., USN  
 FITZGERALD, James L., Lt., USN  
 FRANCUS, Arthur E., Capt., USAF  
 FRANK, Robert L., Lt., USN  
 FRASER, Charles H., Lt., USN  
 FREEBY, Charles W., Lt., USN  
 FRIEDRICH, Vernon D., Lt., USN  
 FRITZ, George S., Capt., USAF  
 FUGLESTAD, Edson V., Lt., USN  
 GALLUP, Samuel C., Lt. Col., USA  
 GAUT, Zane, Lt., USN  
 GILBERT, Francis M., Lt., USN  
 GILLEN, Billy A., Lt., USN  
 GLOVER, Ronald W., Lt., USN  
 GOLDEN, Patrick E., Lt., USN  
 GOLDMAN, Hubert M., Lt., USN  
 GOLDMAN, Winfrey W., Jr., Capt., USAF  
 GORDON, William H., Jr., Lt., USN  
 GOSLING, Robert J., Maj., USA  
 GOTTFRIED, Eugene L., Lt., USN  
 GREENBANK, Arthur J., Lt., USN  
 GREENBERG, Donald H., Lt., USN  
 GRESHAM, Richard B., Lt., USN  
 GRIFFEN, Ward O., Jr., Lt., USN  
 GRIFFIN, Robert P., Lt., USN  
 GROCH, Morris M., Lt., USN  
 GRIZZELL, Karl E., Lt., USN  
 GUMN, Melvin L., Maj., USA  
 HAHN, Walter R., Lt., USN  
 HARDY, Frank W., Maj., USA  
 HARKAVY, Raymond, Lt., USN  
 HARMON, Lewis G., Capt., USAF  
 HARRIS, Frederick G., Lt. Col., USA  
 HARRISON, Ira B., Lt. Col., USA  
 HARTNEY, Thomas C., Lt., USN  
 HARVEY, James D., Maj., USA  
 HATHAWAY, William E., Lt., USN  
 HAUSER, Abraham D., Lt., USN  
 HAWKINS, Joseph A., Maj., USA  
 HAYNES, William F., Jr., Lt., USN  
 HAYNES, William N., Lt., USN  
 HEADRICK, James R., Lt., USN  
 HEARD, Nathan, Jr., Maj., USA  
 HEFFERNAN, John F., Jr., Capt., USAF

## The Board of Thoracic Surgery

(An Affiliate of The American Board of Surgery)

Elmore M. Aroostam, Lt. Col., USA

Harry F. Lenhardt, Capt., USN

Felix P. Ballenger, Capt., USN

Clinton A. Piper, Maj., USA

Sanford W. French, III, Col., USA

## American Board of Urology

James R. Dillon, Jr., Capt., USN

Jesse F. Richardson, Capt., USN

Clarence B. Hewitt, Lt. Col., USA

Joseph A. Syslo, Capt., USN

Evan L. Lewis, Lt. Col., USA

## American Board of Neurological Surgery

Allen F. Kingman, Jr., Lt. Col., USA

James L. Schrickler, Lt. Col., USA

Robert W. Mackie, Comdr., USN

Emil P. Thelen, Comdr., USN

Harold Rosegay, Maj., USA

## American Board of Physical Medicine and Rehabilitation

Anthony L. Britts, Maj., USA

Aniello F. Mastellone, Lt. Col., USA

## American Board of Plastic Surgery

John H. Tenery, Jr., Lt. Col., USA

## The American Board of Preventive Medicine

### Public Health and Aviation Medicine

Donald M. Alderson, Col., USAF

#### Public Health

Allan S. Chrisman, Capt., USN

Lloyd B. Shone, Capt., USN

James P. Pappas, Col., USA

#### Aviation Medicine

Edward A. Anderson, Capt., USN

Raymond T. Jenkins, Col., USAF

Nicholas F. Atria, Col., USAF

Warren E. Klein, Capt., USN

Gennaro Basilicato, Capt., USN

Frank H. Lane, Col., USAF

Edward L. Beckman, Comdr., USN

Ross B. Lautzenheiser, Capt., USN

Laurence A. Bilotta, Col., USAF

Raymond A. Lawn, Col., USAF

Richard L. Bohannon, Col., USAF

Emmert C. Lentz, Col., USAF

L. Render Braswell, Col., USAF

William H. McCortell, Col., USAF

Levi M. Browning, Col., USAF

Harry G. Moseley, Col., USAF

Gordon G. Bulla, Col., USAF

William F. Parent, Col., USAF

Robert F. Carmody, Capt., USN

Sherman M. Peabody, Capt., USN

Joseph A. Connor, Lt. Col., USAF

Bradley W. Prior, Lt. Col., USAF

Arthur H. Corliss, Col., USAF

Carl E. Pruett, Lt. Comdr., USN

Anthony Czerwinski, Col., USAF

Courand N. Rothe, Lt. Col., USAF

William A. DeFries, Lt. Col., USAF

Jack C. Shrader, Lt. Col., USAF

N. Robert Drummond, Col., USAF

David G. Simons, Maj., USAF

Lindsay J. Erwin, Col., USAF

Frederick S. Spiegel, Maj., USAF

James S. Fisackerly, Col., USAF

John P. Stapp, Lt. Col., USAF

James E. Fulghum, Capt., USN

Henry F. Steinbock, Lt. Col., USAF

Harold F. Funsch, Col., USAF

Clarence A. Tinsman, Col., USAF

Lucio E. Gatto, Col., USAF

Albert W. Van Sickle, Col., USAF

George A. Goder, Lt. Col., USAF

Hamilton B. Webb, Lt. Col., USAF

I. Louis Hoffman, Col., USAF

Carl E. Wilbur, Comdr., USN

SCOTT, Daniel J., Jr., Lt., USN  
 SCOTT, Lewis P., III, Lt., USN  
 SEALS, Daniel H., Lt., USN  
 SELLERS, Thomas D., Maj., USA  
 SHAPIRO, Sumner L., Lt., USN  
 SHERLOCK, Paul, Lt., USN  
 SHULL, Thomas E., Capt., USAF  
 SILVERSTEIN, Murra N., Lt., USN  
 SINGER, William, Capt., USAF  
 SINNOTT, John J., Lt., USN  
 SIROKY, Frank X., Capt., USAF  
 SLACK, Richard L., Lt., USN  
 SLEBER, Donald F., Lt., USN  
 SMALL, John H., Lt., USN  
 SMITH, Hugh A., Capt., USAF  
 SNIDER, James J., Lt., USN  
 SORRELL, Meredith E., Lt., USN  
 SOBOCINSKI, Robert S., Lt., USN  
 SPENCER, Richard P., Lt., USN  
 SPIEKERMAN, Ralph E., Lt., USN  
 STEINHEIMER, Mary E., Maj., USA  
 STEVENS, George V., Lt., USN  
 STONE, Henry D., Lt., USN  
 STORK, Werner L., Capt., USAF  
 STRAIT, William F., III, Capt., USAF  
 STRATHAM, Lawrence C., Lt., USN  
 STRUVE, Clemens A., Lt., USN  
 STRYKER, William I., Lt., USN  
 STUART, William T., Jr., Lt., USN  
 STUHLBARG, Jerome, Lt., USN  
 SULICK, Edward J., Lt., USN  
 SULLIVAN, Donald E., Lt., USN  
 SULLIVAN, Michael A., Lt., USN  
 SUTTON, Herman K., Capt., USAF  
 TAYLOR, John A., Jr., Lt., USN  
 THABET, Raymond J., Lt., USN  
 THORPEN, James W., Lt., USN  
 THOMAS, Don F., Lt., USN

THOMAS, Wendell, Lt., USN  
 THOMPSON, John W., III, Lt., USN  
 TRAPNELL, Henry R., Lt., USN  
 TRAVIS, David M., Capt., USAF  
 TREIMAN, Richard L., Lt., USN  
 TRIBBLE, Robert E., Capt., USAF  
 TRUE, Alvin C., Jr., Lt., USN  
 TUCHMAN, Walter W., Lt., USN  
 TWEETEN, John B., Capt., USAF  
 VAN BENSCHOTEN, Ethan B., Capt., USAF  
 VANHOUTEN, Robert J., Lt., USN  
 VAN STETTER, Don P., Capt., USAF  
 VEGASOTO, Jose R., Lt., USN  
 VIELE, Billy D., Lt., USN  
 VONDERMEHDEN, Roy, Lt., USN  
 WALKER, Richard H., Lt., USN  
 WANNAMAKER, Gordon T., Lt. Col., USA  
 WARE, James R., Jr., Lt., USN  
 WASKOWICZ, Aloysius T., Col., USA  
 WAY, Granville S., Jr., Lt., USN  
 WEISS, Paul J., Lt., USN  
 WEISS, Sanford R., Lt., USN  
 WELCH, George B., Capt., USAF  
 WEST, William A., Capt., USAF  
 WESTLIN, William F., Jr., Lt., USN  
 WHEELER, Jim E., Capt., USAF  
 WHETSTONE, Paul M., Lt., USN  
 WILEMAN, Thomas E., Lt., USN  
 WILLIAMS, Edward S., Jr., Capt., USAF  
 WINNING, Clarence W., Lt., USN  
 WIXOM, Ray C., Capt., USAF  
 WREN, Herbert B., III, Lt., USN  
 WRIGHT, Asbury D., Jr., Capt., USAF  
 WYATT, Vell R., Lt., USN  
 YENNEY, Matthew F. J., Jr., Lt., USN  
 YESSLER, Paul G., Lt. Col., USA  
 YOFFEE, Harry F., Lt., USN  
 YUDELL, Robert B., Lt., USN

# DENTAL CORPS

ABRAMS, Melvin L., Lt. Col., USA  
 ALLING, Charles C., Lt. Col., USA  
 AMENTA, Charles A., Jr., Capt., USAF  
 ANDREWS, Lawrence F., Lt., USN  
 ARBUCKLE, Robert B., Lt. Col., USA  
 ARMSTRONG, Edward B., Lt., USN  
 AUSTERMAN, Jack B., Lt., USN  
 AVIS, Ronald J., Lt., USN  
 BACINO, Vincent R., Lt., USN  
 BAILEY, Thomas H., Lt., USN  
 BARANOWSKI, Leo F., Lt. Col., USA  
 BARKLEY, Robert F., Capt., USAF  
 BARLOW, Frederick J., Lt., USN  
 BARRETT, Thomas G., Lt., USN  
 BARRETTE, Roland M., Lt., USN  
 BARTON, John J., Lt., USN  
 BATES, Robert E., Lt. Col., USA  
 BAUMBACH, Richard C., Lt., USN  
 BAUR, Robert D., Lt., USN  
 BAWDEN, James W., Lt., USN  
 BEAUDREAU, David E., Lt., USN  
 BENZAK, Robert J., Lt., USN  
 BENZ, Paul J., Lt., USN  
 BERGQUIST, John J., Capt., USAF  
 BERKOWITZ, Samuel, Lt., USN  
 BESAS, Alan E., Lt., USN  
 BETHART, Hector, Lt. Col., USA  
 BEVIER, David G., Lt., USN  
 BIEBER, Rae L., Lt., USN  
 BILLINGHAM, William A., Capt., USAF  
 BINZAK, John, Lt., USN  
 BOATWRIGHT, Paul L., Capt., USAF  
 BONSALE, Horace K., Jr., Lt., USN  
 BOWERS, Gerald M., Lt., USN

BOYCE, James R., Lt., USN  
 BOYD, Neil P., Lt., USN  
 BOYKO, Nicholas, Capt., USAF  
 BRANNAN, John D., Lt., USN  
 BRATTON, Joe B., Capt., USAF  
 BRIGGS, Earland D., Lt., USN  
 BRONSKY, Donald A., Lt., USN  
 BROTHERS, Marshall A., Lt., USN  
 BROWNING, Grisby G., Lt., USN  
 BURNS, Doyle E., Lt. Col., USA  
 BURRISON, Robert J., Lt., USN  
 CADARETTE, John R., Lt., USN  
 CAMPBELL, William R., Lt., USN  
 CAPEK, Kale A., Lt., USN  
 CAPOZZILLI, Albert A., Lt., USN  
 CARDAMON, Albert J., Lt. Col., USA  
 CARRINGTON, Paul B., Lt., USN  
 CASHON, Jordan F., Jr., Capt., USAF  
 CHARNLEY, Leonard R., Lt., USN  
 CHUTTER, Reinald J., Lt., USN  
 CIOCCO, Carmen L., Lt., USN  
 CLARK, Robert R., Lt. Col., USA  
 CLARKE, Homer, Lt., USN  
 COLBIE, Carl K., Lt., USN  
 CONNER, Jack R., Capt., USAF  
 COTE, Earle F., Lt., USN  
 CRAIG, Robert F., Lt., USN  
 CROWLEY, Leo T., Jr., Lt., USN  
 CURRAN, John P., Lt., USN  
 DANA, Donald S., Lt., USN  
 DAVIDSON, Robert A., Capt., USAF  
 DEDAN, Gilbert P., Lt., USN  
 DEPUTY, Byard S., Lt., USN  
 DENVER, Paul I., Lt., USN



# MEDICAL CORPS--Continued

HEITKAMP, Harold A., Lt., USN  
 HENDERSON, Harry M., Jr., Lt. Col., USA  
 HERRMANN, Louis A., Lt., USN  
 HEWSON, William C., Lt., USN  
 HEYL, Guy C., Jr., Capt., USAF  
 HODRILE, A. Ibar V., Col., USA  
 HILL, Teroy J., Lt., USN  
 HOLEMAN, Charles W., Jr., Capt., USAF  
 HOLT, Clifton L., Capt., USAF  
 HOCPS, Harold J., Jr., Lt., USN  
 HOCKING, Robert G., Capt., USAF  
 HOCK, George W., Maj., USA  
 HUGENPOLTZ, Paul G., Capt., USAF  
 HURST, Wendell F., Capt., USAF  
 HYLAND, John W., Lt., USN  
 HYMAN, Louis F., Capt., USAF  
 IER, Edvard I., Jr., Lt., USN  
 IFTT, Arnold M., Capt., USAF  
 IGEFF, Carium, Capt., USAF  
 JUEL, Roger A., Lt. Col., USA  
 KAHN, Leonard, Lt., USN  
 KATNER, Alan, Capt., USAF  
 KARLIN, David E., Lt., USN  
 KAUFMAN, Herbert A., Lt., USN  
 KE'LEY, Donald J., Capt., USAF  
 KIEFHABER, Ray E., Lt., USN  
 KINGTON, Garfield D., Lt., USN  
 KIRBY, Edward J., Capt., USAF  
 KISKEE, Walter R., Lt., USN  
 KLIMAN, Gilbert W., Lt., USN  
 KLUGE, Robert C., Lt., USN  
 KISCHT, Evan E., Lt., USN  
 KOVAL, Raymond P., Capt., USAF  
 KRANITZKY, Henry J., Lt. Col., USA  
 KRUTZFLIER, Adrian R., Capt., USAF  
 KUNZ, Lyle B., Capt., USAF  
 LANDIS, Richard F., Lt., USN  
 LARSON, Donald J., Capt., USAF  
 LAVINE, Harris, Lt., USN  
 LAVLER, Paul E., Jr., Lt., USN  
 LEBLANC, Gilbert A., Lt., USN  
 LECCOC, Frank R., Capt., USAF  
 LEINER, Jacob S., Lt., USN  
 LEVIN, Bernard K., Maj., USA  
 LEVY, Ira H., Capt., USAF  
 LEVY, Morris W., Lt., USN  
 LEWIS, Charles E., Capt., USAF  
 LEWIS, Norman G., Lt., USN  
 LINDICAT, Douglas A., Capt., USAF  
 LOWREY, Ferrell C., Jr., Lt., USN  
 LOVRY, Donald J., Capt., USAF  
 LUBIN, Sidney T., Capt., USAF  
 LUKAS, John R., Lt., USN  
 LUKEMAN, John M., Lt. Col., USA  
 LUSK, John A., Capt., USAF  
 MAASCH, Lloyd P., Lt., USN  
 MARRY, Charles C., Lt., USN  
 MARIOWELL, Frederick, Jr., Capt., USAF  
 MACKAY, Edmund A., Jr., Lt., USN  
 MACNAUGHTON, Ralph E., Lt., USN  
 MACOUNG, David E., Lt. Col., USA  
 MAGNANT, George J. A., Lt., USN  
 MALCOLM, Robert S., Jr., Capt., USAF  
 MANKIN, Henry J., Lt., USN  
 MARTEN, Robert D., Lt., USN  
 MAYER, William E., Maj., USA  
 MAZUZAN, John E., Jr., Capt., USAF  
 McAFEE, David K., Capt., USAF  
 McLELLAN, John B., Maj., USA  
 McDAWELL, James W., Lt., USN  
 McDOATELL, Marion E., Lt. Col., USA  
 McFADDEN, James A., Jr., Lt., USN  
 McGEE, John E., Lt., USN  
 McMAHON, Edmund B., Lt., USN  
 McMAHON, John W., Lt., USN

McNEILL, Donald R., Jr., Lt., USN  
 WEEKS, Hugh F., Lt., USN  
 MEDHARDT, Ralph F., Lt., USN  
 MERCHERY, William E., III, Lt. Col., USA  
 MILLER, John M., Lt., USN  
 MOLLOY, Joseph E., Maj., USA  
 MONTGOMERY, Clifford L., Lt., USN  
 MORALES-VILA, Eduardo H., Capt., USAF  
 MORELAND, Joe A., Capt., USAF  
 MORENO-SALAS, Esteban, Capt., USAF  
 MOSS, Ernest H., Maj., USA  
 MURPHY, Joseph L., Lt., USN  
 NADMARK, David E., Col., USA  
 NELSON, James H., Jr., Lt., USN  
 NELSON, John R., Capt., USAF  
 NELSON, William J., Jr., Lt., USN  
 NEMER, Stuart S., Jr., Lt., USN  
 NEVILLE, George M., Jr., Lt., USN  
 NOGUCHI, Seiji, Maj., USA  
 NORDLAND, James H., Capt., USAF  
 NOVOSAD, Charles L., Jr., Lt., USN  
 OCHSNER, Morris G., Lt., USN  
 OLIVER, Henry R., Lt., USN  
 OPSAHL, Harold E., Col., USA  
 O'SHAUGHNESSY, Edward J., Maj., USA  
 OATNEY, Richard F., Lt., USN  
 PALERI, Alphonse F., Lt., USN  
 PARKS, James C., Jr., Lt., USN  
 PARROTT, John C., Capt., USAF  
 PARVIN, Robert W., Lt. Col., USA  
 PEARSON, Howard A., Lt., USN  
 PEOPLES, Richard B., Lt., USN  
 PETERSON, Lewis A., Lt., USN  
 PEIRCHONET, Ramon, Lt., USN  
 FISCHENOTTE, William O., Lt., USN  
 FLOUGH, Irvin C., Lt. Col., USA  
 FLYLER, Joseph A., III, Lt., USN  
 FODELL, Harry D., Lt., USN  
 FOTTER, Ralph M., Jr., Lt. Col., USA  
 FOWELL, Carl E., Capt., USAF  
 FOWER, Robert E., Lt., USN  
 GUTE, Paul G., Lt., USN  
 RADIE, David B., Lt., USN  
 RALSTON, John C., Jr., Lt., USN  
 RANDALL, John T., Lt., USN  
 RANKIN, Charles A., Jr., Lt., USN  
 RAYMOND, Bruce A., Maj., USA  
 REINHART, Robert L., Lt., USN  
 RENNER, Robert R., Lt., USN  
 RENTSCOR, Samuel W., Jr., Lt., USN  
 REYNOLDS, Gerald D., Lt., USN  
 RICHARDS, Benjamin T., Capt., USAF  
 RIZZO, Charles A., Lt., USN  
 ROBERTS, Thomas L., Lt. Col., USA  
 ROBINSON, Herbert J., Lt., USN  
 POTNER, Melvin, Lt., USN  
 ROEBROUGH, James F., Jr., Lt., USN  
 ROSENBLATT, Malcolm L., Lt., USN  
 ROSS, John A., Lt., USN  
 ROUTSAVILLE, Robert T., Lt., USN  
 RUPPEL, Robert J., Lt., USN  
 RUSSELL, Revelle, Capt., USAF  
 SALS-DANOS, Carlos J., Capt., USAF  
 SALISBURY, Edward M., Lt., USN  
 SAMLER, Jacob D., Capt., USAF  
 SANCHEZ-MUNOZ, Pascua, Lt., USN  
 SCALES, Allen D., Lt., USN  
 SCAVONE, Edmond, Lt. Col., USA  
 SCHAEFER, John A., Lt., USN  
 SCHEHL, Charles A., Jr., Lt., USN  
 SCHERER, Irvin G., Lt., USN  
 SCHUCH, Charles D., Maj., USA  
 SCHMITZ, Nicholas W., Lt., USN  
 SCOGIN, John T., Capt., USAF  
 SCOKEL, Paul W., III, Lt., USN

SCOTT, Daniel J., Jr., Lt., USN  
 SCOTT, Lewis P., III, Lt., USN  
 SEALS, Daniel H., Lt., USN  
 SELLERS, Thomas D., Maj., USA  
 SHAPIRO, Sumner L., Lt., USN  
 SHERLOCK, Paul, Lt., USN  
 SHULL, Thomas E., Capt., USAF  
 SILVERSTEIN, Murra N., Lt., USN  
 SINGER, William, Capt., USAF  
 SINNOTT, John J., Lt., USN  
 SIROKY, Frank X., Capt., USAF  
 SLACK, Richard L., Lt., USN  
 SLEBIR, Donald F., Lt., USN  
 SMALL, John H., Lt., USN  
 SMITH, Hugh A., Capt., USAF  
 SNIDER, James J., Lt., USN  
 SORRELL, Meredith E., Lt., USN  
 SOBOCINSKI, Robert S., Lt., USN  
 SPENCER, Richard P., Lt., USN  
 SPIEKERMAN, Ralph E., Lt., USN  
 STEINHEIMER, Mary E., Maj., USA  
 STEVENS, George V., Lt., USN  
 STONE, Henry D., Lt., USN  
 STORK, Werner L., Capt., USAF  
 STRAIT, William F., III, Capt., USAF  
 STRATHAM, Lawrence C., Lt., USN  
 STRUVE, Clemens A., Lt., USN  
 STRYKER, William I., Lt., USN  
 STUART, William T., Jr., Lt., USN  
 STUHLBARG, Jerome, Lt., USN  
 SULICK, Edward J., Lt., USN  
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 WOODEN, Robert A., Lt., USN  
 WOOL, Arthur L., Lt., USN  
 YEAGER, Arthur L., Lt., USN  
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 ZAZZARO, John J., Jr., Lt., USN  
 ZACK, John S., Lt. Col., USA  
 ZUCKERMAN, Julius, Lt., USN

## Reviews of Recent Books

GLAUCOMA, A Symposium organized by The Council for International Organizations of Medical Sciences, established under the joint auspices of UNESCO and WHO. Editor, Sir *Stewart Duke-Elder*, England. 350 pages; illustrated. Charles C Thomas, Publisher, Springfield, Ill., 1955. Price \$7.50.

This symposium, composed of 20 of the best-known international authorities on this subject, was extremely timely and necessary due to the recent advances in knowledge on glaucoma. This excellent book not only brings the subject of primary glaucoma up to date, but also attempts to standardize nomenclature. The purpose of the symposium is stated beautifully in a thought-provoking introduction by Sir Stewart Duke-Elder on the "Fundamental Problem of Glaucoma"—the etiology and fundamental nature of primary glaucoma.

Barkan, in 1938, introduced an anatomic method of nomenclature, and used the terms "narrow-angle" and "wide-angle" glaucoma. This was a step forward but still not ideal. Until more satisfactory terminology is proposed and accepted, the symposium has advocated the terms "closed-angle" and "simple" glaucoma.

Approximately half of this printed symposium is devoted to the anatomic, physiologic, and related aspects of primary glaucoma, the rest emphasizing gonioscopy and provocative tests, with least emphasis on the clinical aspects of therapy and treatment.

This is a most excellent and timely book on the fundamentals of glaucoma, made interesting by the comments of the various panel members, and showing by their occasional disagreement that the subject is still in the process of being studied, investigated, and becoming understood.

Due to the problems posed, the many unanswered questions, and the necessity to search out the causes of glaucoma, this symposium necessarily emphasizes the theoretic rather than the clinical aspects.

Considerable scientific and experimental physiologic data have been included and used as a basis for many of the theories promulgated by the symposium members. The scientific part is of great value for researchers and thorough students of the subject, yet the conclusions drawn from the research are presented in such a readable manner, both as scientific papers and as discussions by the clinical members of the panel, that not only the man in research and the advanced student, but even a busy practitioner with limited time to read, can profit by reading this symposium.—KARL D. MacMILLAN, Col., MC, USA

**SUBACUTE BACTERIAL ENDOCARDITIS**, by *Andrew Kerr, Jr., M. D.* A Monograph in the Bannerstone Division of American Lectures in Internal Medicine, edited by *Roscoe L. Pullen, M. D., F. A. C. P.* 343 pages. Charles C Thomas, Publisher, Springfield, Ill., 1955. Price \$6.50.

The author has condensed a wealth of material into a monograph of some 266 pages covering a subject of interest to everyone in the field of medicine and one which we agree was in need of documentation. It is just as true today as in 1885 when Sir William Asher said of ulcerative endocarditis, "It is of use from time to time to take stock, so to speak, of our knowledge of a particular disease, to see exactly where we stand in regard to it."

The chapters covering antibiotic therapy are outstanding, as is the bibliography. The chapter on the history of subacute bacterial endocarditis is particularly well done and makes interesting reading. In some places, however, the author has incorporated too much statistical data which makes the reading a bit difficult.

The monograph is excellent and can be recommended as good reading to those interested in this disease. It is recommended to the busy general practitioner as a splendid reference.

—MELVILLE M. DRISKELL, Capt., MC, USN

**A COURSE IN PRACTICAL THERAPEUTICS**, by *Martin Emil Rehfuess, M. D., F. A. C. P., LL. D. (Hon.)*, *Alison Howe Price, M. D.*, and 24 contributors. 3d edition. 972 pages; illustrated. The Williams & Wilkins Co., Baltimore, Md., 1956. Price \$15.

This book presents a comprehensive course in clinical therapeutics by 24 contributors, all but two of whom are from the staff of Jefferson Medical College or Hospital. This adds greatly to the continuity of the text. Of necessity the text is voluminous and is not to be read from cover to cover but should be on the desk of every practicing physician for ready reference. It is ideal for interns and residents.

This edition has retained the same format of the previous two. It is written in outline form with a double column to each page for easy readability. It has been revised, and recent advances in medicine and technique have been included. The illustrations are of excellent quality and consist of schematic drawings and colored plates that are used mainly as diagnostic aids.

The first section on general therapeutic principles is short but covers such important subjects as diagnostic survey, formation of a definite plan of treatment, and advice as to contents of the physician's bag. In the next section on symptomatic therapy, page references to one of the other two sections, the treatment of specific disorders, and special treatment, are given whenever indicated.

This book fulfills its intended purpose. It is well worth its cost and is recommended for the daily use of the practicing physician.

—PATRICK L. McSHANE, Col., MC, USA

ATOMIC ENERGY RESEARCH AT HARWELL, by K. E. B. Jay. 144 pages; illustrated. Philosophical Library, Inc., New York, N. Y., 1955. Price \$4.75.

This book is a generalized summary of the functions of the Atomic Energy Research Establishment at Harwell in England. It is divided into two parts, the first of which is concerned with the Harwell establishment participation in various fields of research such as reactors, isotopes, instrument development, et cetera, and how these efforts are co-ordinated with and support the production and weapons development phases. The second part gives a detailed description from a fundamental research standpoint, of some important projects under study, which are carried on in the physics, chemistry and chemical engineering, and metallurgy divisions.

The work is readable and in pleasing style, but understanding it requires some knowledge of the general subjects covered and of atomic energy programs. The part on fundamental research presupposes a fairly extensive background in science as stated in the author's foreword to that section.

The entire text well outlines the scope of work being done at Harwell, with enough references to other agencies within the United Kingdom's atomic energy program, without getting into classified information, so that an over-all inference may be drawn as to their extensive coverage in the field. —CLINTON S. MAUPIN, Col., MC, USA

A. M. A. SCIENTIFIC EXHIBITS 1955. Sponsored by Council on Scientific Assembly, American Medical Association. 784 pages; illustrated. Grune & Stratton, Inc., New York, N. Y., 1955. Price \$20.

For the first time, physicians unable to attend the American Medical Association convention held in Chicago, 1955, will be able to "see" the exhibits presented and study them at their leisure.

The exhibits depicted in this volume approximate one third of the total shown at the Annual Convention. Many of the exhibits depicted in this volume have been singled out by the A. M. A. Committee of Awards for Certificates, Awards, and Honorable Mention. Included also are exhibits that have a wide appeal for practicing physicians. While the photographs depicting these exhibits mirror some of the shortcomings of the exhibits themselves, it must be remembered that they are not primarily constructed for the purpose of photographic reproduction. Further, it would not be practicable, even if possible, to construct exhibits to serve the dual purpose of "live" as well as photographic presentation. In addition, some of the photographs submitted by the exhibitors were nonprofessional in quality. To attempt to do such work at a professional level and in color would have been financially prohibitive.

For these reasons, the reader will discover, from time to time, a portion of a page on which graphs or copy appear faded or illegible.

Some illustrations also suffer from the inferior quality of original photography submitted for reproduction. Despite these obvious shortcomings, common to any pioneering effort, this book should have a wide appeal to the many physicians who could not be present at the convention. There is no other book to which they can turn for this information, and the information presented is, in effect, a postgraduate course par excellence available to them nowhere else.

The planning and production of this volume of some 800 pages was a prodigious undertaking requiring rare courage from inception to delivery. The A. M. A. has a "lion by the tail," and this reviewer hopes that it won't let go.—ROBERT V. SCHULTZ, *Capt., MC, USN*

**VIRUS AND RICKETTSIAL DISEASES**, by S. P. Bedson, M. D., D. Sc., F. R. C. P., F. R. S.; A. W. Downie, D. Sc., M. D.; F. O. MacCallum, M. D.; and C. H. Stuart-Harris, M. D., F. R. C. P. 2d edition. 406 pages; illustrated. The Williams & Wilkins Co., Baltimore, Md., 1955. Price \$6.75.

In this small book, an attempt is made to summarize for the "practicing physician" current knowledge of the virus and rickettsial infections of man. As in the first edition the text is written by four authors and is subdivided into chapters concerned with specific diseases. Each of the authors endeavors to present a coherent, readable account rather than an exhaustive treatise on the various diseases, and the space devoted to the various chapters is determined by extent of knowledge rather than the medical importance of the disease. Infections are described primarily from the causative point of view, and clinical descriptions are limited to bare outlines. Descriptions of procedure for laboratory diagnosis, while sketchy at times, are included wherever possible. Epidemiology and disease control are stressed where increased knowledge of the infectious agent and of its natural history has indicated measures of practical value.

In its broad outline, this second edition remains essentially unchanged. Most important revisions have been made of the chapters on poliomyelitis and the chemotherapy of rickettsial infections. A description of Murray Valley encephalitis has been added to the chapter on arthropod-borne virus encephalitis, and the Coxsackie viruses have been allocated a chapter of their own. These additions and revisions were prompted by recent advances in knowledge of these specific infections. The book retains its introductory chapters on the general characteristics, immunology, and natural history of viruses, but drops the older section on bacteriophage. Illustrations are well done and appropriate to the text.

This volume will serve as an excellent introductory text in medical virology for students or as a handy office reference for the practicing clinician. For the clinician, an outline of methods for laboratory diagnosis of virus and rickettsial disease is presented as an appendix. This outline is comprehensive yet concise and indicates the nature

of specimens required for laboratory diagnosis. This book, however, with its abridged text and shortened bibliography, is not sufficiently comprehensive to satisfy the scientifically curious physician or to be of much value to the student of infectious disease.

—EDWARD L. BUESCHER, *Maj., MC, USA*

**HUMAN PHYSIOLOGY**, by F. R. Winton, M. D., D. Sc., and L. E. Bayliss, Ph. D. 4th edition. 616 pages; 236 illustrations. Little, Brown & Co., Boston, Mass., 1955. Price \$8.

This is the fourth edition of a now familiar small textbook on human physiology. A number of well-known English professors, currently active in research and teaching, have collaborated in a direct approach to the essential fundamentals. In order to keep the book within a readable size for the student, many of the nonessentials have been intentionally omitted. Nevertheless, the details, as presented, are sufficient to encourage "the intellectual attitude of an alert explorer."

This edition is divided into 17 sections, including several entirely new chapters. Those on respiration, body fluids, and transmission at nerve endings are set forth in a particularly clear and practical manner. Perhaps it is a little early for incorporation into a standard text, but I was surprised to note that there is little reference to recent advances in our understanding of physiologic principles through biophysical techniques, including the use of isotopes.

The volume is written in the simple, direct fashion that we have come to admire in English textbooks. In addition to its use as a student's text, I would like to recommend it as a general reference for those interested in the biologic sciences who feel they require a review of the principles of human physiology.

—JAMES B. HARTGERING, *Lt. Col., MC, USA*

**ATLAS OF GENERAL SURGERY**, by Joseph R. Wilder, M. D. 222 pages; 101 plates. The C. V. Mosby Co., St. Louis, Mo., 1955. Price \$13.50.

This book is an illustrated atlas of general surgery. The author, by the use of selected line drawings, describes the surgical technic in a large number of standard procedures most frequently performed by the general surgeon. The author has included only those procedures and techniques that are generally accepted and has eliminated those which are controversial.

Preceding the description of the various steps in each operation is a brief discussion of the indications for the procedure, together with a list of special considerations, which mention the complications and dangers in the performance of the operation.

This book will be especially valuable as a reference book for the medical student, intern, resident, and general surgeon.

—HAROLD G. YOUNG, *Capt., MC, USN*



PEPTIC ULCER, *Diagnosis and Treatment*, by Clifford J. Barborka, M. D., M. S., D. Sc., F. A. C. P., and E. Clinton Texter, Jr., M. D. 290 pages; 33 illustrations. Lisle, Brown & Co., Boston, Mass., 1955. Price \$7.

This small handbook crams a tremendous amount of valuable information on peptic ulcer into its pages. The authors, who are recognized authorities on gastro-intestinal diseases, touch the high points of the ulcer problem lightly, but show great skill in sifting out what is of essential merit from the vast amount of medical literature that has accumulated on this disease. The work is essentially a compact, handy reference book for the general practitioner and medical student. It is not sufficiently comprehensive to serve as a source book for the gastroenterologist, research worker, or abdominal surgeon. It is written in an engaging and easily readable style. The latest developments on the etiology and pathogenesis of peptic ulcer and the current opinions of well-recognized gastroenterologists on the medical and surgical treatment of the disease are presented in a concise, authoritative manner. Much of the content is so clearly and simply presented that it will be intelligible to the educated lay ulcer patient, and will help him understand and manage his disease more intelligently.

The book is composed of 14 short chapters, each of which is followed by a fairly extensive bibliography. The chapters on symptomatology, diagnosis, medical treatment, dietary management, complications, and the gastric ulcer-cancer problem are especially well written. The chapters on anatomy and physiology, etiology, and pathogenesis are hampered by the necessity of condensing a large amount of material into a few pages. The authors' approach to the gastric-ulcer problem is rational and impartial. The importance of the doctor-patient relationship in the management of peptic ulcer is given proper emphasis, but the very important role of emotional factors in the etiology and management of ulcer is given too little consideration. The discussion of the anti-cholinergic drugs and their use in treating acute and chronic ulcer disease is well presented.

In summary, this book should prove to be a handy reference book for the busy general practitioner and medical student. Portions of it should be suitable for the ulcer patient who is interested in learning more about his disease.—EMMETT L. KEHOE, Col., MC, USA

A SURVEY OF CLINICAL PRACTICE IN PSYCHOLOGY, edited by Eli A. Rubinstein, Ph. D., and Maurice Lorr, Ph. D. 363 pages. International Universities Press, Inc., New York, N. Y., 1954. Price \$6.

The versatility of situations in which clinical psychologists make useful contributions to the understanding of the problems of individual human beings is shown by 27 chapters, each devoted to a different area or setting. The impossibility of the individual psychologist's being conversant with the entire range of practice is patent. For instance, despite clinical experience with public school, Navy, county, medical school, and Veterans Administration facilities, the present

reviewer could claim personal acquaintanceship with only six of the 27 areas discussed. This book, therefore, can supply orientation and specific information for practicing psychologists who ought to be informed about clinical settings other than their own.

Illustrated by the various chapters are the tasks, methods of approach, tools used, and research challenges to be found in clinics for aged persons, alcoholics, students, employees; in clinics attached to municipal and juvenile courts, training schools for delinquents, and prisons; in clinics for speech problems, hearing problems, reading disability, and physical rehabilitation; and in medical school centers, psychological service centers, and private practice. There are also excellent descriptions of the relatively large scale (as compared with a university clinic, for example) programs for the utilization of the abilities of psychologists in the Veterans Administration, the Army, the Navy, the Air Force, and the Public Health Service. Even the psychologists actively working in these programs will be able to learn more about the place of their own professional responsibilities in the whole picture.

This is an exceptionally well-planned volume for coverage and for the competence of the individual contributors. It will be of great use to clinical psychologists on a professional level, but will also be used in the training of psychologists—not to tell them about how to test or to interview, but to tell them some very practical things about how it is to be a clinical psychologist earning a living and trying to make the world a little better and happier for those served by psychology.

—WALTER L. WILKINS, *Comdr., MSC, USNR*

TEXTBOOK OF SURGERY, edited by H. F. Moseley, M. A., D. M., M. Ch. (Oxon), F. A. C. S., F. R. C. S. (Eng.), F. R. C. S. (C). With Foreword by G. Gavin Miller, M. D., C. M., M. Sc., F. R. C. S. (C), F. A. C. S. 2d edition. 1,136 pages; with 571 illustrations and 79 color plates. The C. V. Mosby Co., St. Louis, Mo., 1955. Price \$16.50.

The foreword states that the objective of this text is to supply the medical student with the surgical information which he needs in order to graduate. To comply with that objective is a task which leads to differences of opinion relative to the merit of this or that subject. What appears appropriate to one contributor may raise a storm of controversy from others.

The orderly arrangement of the contents makes the volume easy to use as a ready reference. Many of the chapters devote much space to surgical technic that is not within the province of the medical student but which may, however, be of value to residents and practitioners. In this respect, it may be construed that the text oversteps its stated objective and some of the contributions lead into highly controversial fields which can be truly evaluated only by experience.

The illustrations and color plates are interesting and instructive. Much credit should be given to those responsible for the illustrations.

The bibliographies and film references are very useful and the references to the teaching film libraries are particularly welcomed. The new chapters on radioactive isotopes and on the acute abdominal conditions have clearly brought out many timely advances.

The plan to place in one volume all that the medical student should know relating to general surgery and all the surgical specialties has resulted in the production of this first Canadian Textbook of Surgery. It is now placed alongside several other textbooks of similar nature, providing the student another choice for his personal library.

—PHILIP J. McNAMARA, Capt., MC, USN

**INLAYS AND ABUTMENTS, Their Preparation and Construction for Dental Restorations**, by Jacob R. Schwartz, D. D. S. 478 pages; 512 illustrations, Dental Items of Interest Publishing Co., Inc., Brooklyn, N. Y., 1953. Price \$8.

The text is directed primarily to the student, although the excellent illustrations of the required steps for each cavity preparation should provide a valuable reference for the practitioner. The meticulous detail devoted to armamentarium, classification of cavities, and the operator's position at the chair will be appreciated by the student, but is likely to be tedious to the practitioner who is not interested in a review of these subjects.

The chapters follow in logical sequence with the exception of chapters 5 and 6. Chapter 6 on "Operative Positions at the Chair" would be better situated at the beginning of the text, and chapter 5, "A Mathematical Computation of the Permissible Number of Practical Preparations," could be omitted without altering the scientific value of the publication. Indications and contraindications for the various restorations described are insufficiently emphasized, and the very important phase of treatment plan with diagnostic aids has been completely neglected.

The chapters "Highlights in Dental Casting," "Casting Investment Compound," and "Controlled Casting" are worthy inclusions and could be advantageously perused by anyone engaged in the casting of gold.

The text is well written and contains many historical highlights of dentistry, as well as a thorough historical background for each restoration. The abundant illustrations are exceptionally well done and are judiciously dispersed to simplify the step-by-step progress of each cavity preparation. —LESLIE R. ALLEN, Lt. Col., USAF (DC)

**AMERICAN PHARMACY, Textbook of Pharmaceutical Principles, Processes and Preparations**, edited by Rufus A. Lyman, M. D., and Joseph B. Sprowls, Ph. D. Consulting Editor, George Urdang, Ph. G., D. Sc. Nat., Sc. D. (h. c.). 4th edition. 478 pages; illustrated. J. B. Lippincott Co., Philadelphia, Pa., 1955. Price \$9.75.

This well-known textbook is in its fourth edition in the past 10 years. The new edition brings it abreast of the latest revisions of the U. S. Pharmacopeia and the National Formulary. It is divided into two

parts, the first concerned with general principles and processes and the second with specific pharmaceutical preparations. In the first part, as is usual, a great deal of space is devoted to weights and measures and the elementary chemical and physical procedures used by the manufacturing pharmacist. This portion is well illustrated with pictures of important and current equipment used by the dispensing and manufacturing pharmacist. The historical portions are particularly well discussed. The specific preparations are discussed in considerable detail. Most of the chapters are well documented, and there is an adequate index. This textbook, in its new edition, should continue to find an important place in the instruction of students of pharmacy and will be a valuable guide to the pharmacist in the services.—PAUL K. SMITH, Col., USAFR

RECENT ADVANCES IN NEUROLOGY AND NEUROPSYCHIATRY, by Sir Russell Brain, Bt., D. M. (Oxon.), P. R. C. P., and E. B. Strauss, M. A., D. M. (Oxon.), D. Sc., F. R. C. P., with the assistance of Denis Hill, M. B., F. R. C. P., D. P. M., Douglas Northfield, M. S., F. R. C. S., and David Sutton, M. D., M. R. C. P., F. F. R., D. M. R. D. 6th edition. 311 pages; 43 illustrations. Little, Brown & Co., Boston, Mass., 1955. Price \$7.50.

The current edition of this very stimulating and informative summary of recent advances, principally in the field of neurology and neurophysiology rather than in psychiatry, continues to maintain and improve on the usual high standards employed by these authors in all their writings. The text is a beautiful example of intelligent and "common-sense" summarizing of up-to-date and recent advances in these fields, which considerably reduces the confusion experienced by those who attempt to review the literature on their own. Furthermore, the text has been entirely rewritten with the inclusion of new chapters on electroencephalography and neuroradiology. The authors stress the increasing importance of the relationship of psychiatry to neurology and the need for psychiatrists to possess neurologic knowledge, as continuing progress in neurophysiology, electroencephalography, clinical neurology, and neurosurgery emphasizes the common ground between them.

By admission, the authors lay no claim to comprehensive covering of all subjects and have limited themselves to careful selection of those advances having important clinical bearing or application. This goal has been admirably attained. Unlike the usual yearbooks which merely abstract the literature with all too little discussion and/or continuity, this text is complete within itself, and furnishes sufficient historical background to permit the reader to comprehensively grasp the subjects discussed. It is to be lamented that 10 years have elapsed since the last revision, and it is hoped that widespread appreciation for the yeoman service performed by these authors will be forthcoming and sufficiently rewarding to permit more frequent editions in the future. Certainly the busy practicing neurologist as well as the student will bless them for their efforts. The chapters on the frontal lobes, cervical disk and spondylosis, and electroencephalography seemed particularly lucid and valuable.—RICHARD R. CAMERON, Col., MC, USA

THE DISEASES OF OCCUPATIONS, by *Donald Hunter, M. D., F. R. C. P.* 1,046 pages; illustrated. Little, Brown & Co., Boston, Mass., 1955. Price \$20.

This new monograph reviews on a broad basis the relationship of disease to occupation, considering nearly every conceivable type of work. In a somewhat disjointed but intriguing way, the opening chapters deal with some of the historical, social, and economic backgrounds of human occupations. The subject has been established on an academic footing by tracing the origin and evolution of trade and health laws and practices, particularly in England.

A brief bibliography follows each chapter. Because the contents have been drawn from worldwide publications, the occupational diseases covered are representative of worldwide experience in this field. The presentation includes historically obsolete health conditions as well as current conditions and those originating from use of new chemicals and processes.

The book is handsomely bound and written in an interesting, easy-to-read style.

The author, in his stimulating treatment of the subject, lays a good foundation for a further study of the etiology, epidemiology, and prevention of occupational disease. He has succeeded admirably in relating environment to disease but does not discuss the patient to the extent often observed in other texts on this subject. Some of the illustrative material seems to be superfluous but most of it is well presented for the student or physician who is being introduced to this field.

Although this book was designed primarily for use by the student, general practitioner, and consultant, the industrial medical officer and industrial hygiene engineer will find it an excellent adjunct to their libraries.

The specialist industrial medical officer and industrial hygiene engineer, on the other hand, will need to consult other books that are more detailed. In some instances, where work hazards are related to such materials as chlorinated hydrocarbons and lead, control measures do not sufficiently emphasize the importance of the periodic physical examination in preventing occupational disease. With such other materials as TNT and nitroglycerine, the importance of minimizing the exposure of the individual person to the toxic agent if adverse effects are to be avoided is not sufficiently stressed.

—EDWARD J. DEHNE, Lt. Col., MC, USA

OBSTETRICAL ROENTGENOLOGY, by *Robert Berman, M. D., F. A. C. S.* Second volume of a series of Monographs on Obstetrics & Gynecology, edited by *Claude E. Heaton, M. D.* 599 pages; 486 illustrations. F. A. Davis Co., Philadelphia, Pa., 1955. Price \$12.50.

This book is intended to be used by physicians who are actively interested in the subject of obstetrics and should be in the library of

all physicians who are engaged in the practice of obstetrics and roentgenology. In this book the author has covered the entire field of roentgenology as it applies to the products of conception and the bony passageway through which they must pass. This includes the determination of the size and shape of the maternal pelvis; the size, position, number, and development of the fetus or fetuses; and the position within the uterus of the placenta. The author has gone into detail to compare the different methods of x-ray pelvimetry commonly in use today, has pointed out their good and bad features, and has presented his modification of one of these methods. The book is filled with numerous excellent reproductions of roentgenograms. In addition he has covered the technical points and equipment which enter into the production of the roentgenograms and the methods which are used to correct for magnification and distortion. It is felt that the author has done an excellent job of covering this subject, and it is thought that every radiologist and obstetrician will gain in knowledge by reading this book.— JOHN S. FEATHERSTON, Lt. Comdr., MC, USN

**THERAPY OF FUNGUS DISEASES**, An International Symposium, edited by Thomas H. Sternberg, M. D., and Victor D. Newcomer, M. D. Presented June 23, 24, 25, 1955, by The Division of Dermatology, Department of Medicine, School of Medicine and Medical Extension, University Extension, University of California at Los Angeles. 337 pages; illustrated. Little, Brown and Co., Boston, Mass., 1955. Price \$7.50.

This book consists of 54 papers presented by scientists from all over the world at an international symposium held under the auspices of the Division of Dermatology, School of Medicine and Medical Extension, University of California at Los Angeles. This symposium was held to stimulate an exchange of ideas on both a national and an international level concerning the therapy of fungus infections. A total of 208 scientists participated, representing 24 states and 8 foreign countries.

Both the superficial and deep mycotic infections are covered in the papers. Several of the papers report on the status of fungus infections in such countries as India, France, Argentina, Brazil, Mexico, the Philippines, and the Ukraine. The basic biology of fungi, including host-parasite relationship, influence of hormones, soil as their natural reservoir, immunity, nutrition, genetics, et cetera, is discussed.

Many of the papers report on experimental trials in vitro and in vivo, both in animals and humans, of newer drugs such as the aromatic diamidines, cinnamic acids, nitrostyrenes, sulfonamide and sulfone compounds, chlorquinaldol, thodanine, antihistamines, and the antibiotics filipin and nystatin. There were 16 papers on nystatin alone. The introductory remarks by Dr. Donald M. Pillsbury present many basic problems in the investigative approach to the therapy of fungus diseases.

The attempts at therapy, as presented in the papers themselves, reflect the general concern of the writers for the basic problems of

physiology, biochemistry, and pathology of fungus diseases and, therefore, may well indicate the path of future research.

The book is well illustrated with graphs that are easily understood. It is well worth reading by dermatologists and should be in all reference libraries. —KARL V. KAESSE, Capt., MC, USN

THE SURGICAL TECHNIC OF ABDOMINAL OPERATIONS, by Julius L. Spivack, M. D., LL. D., F. A. C. S. 5th edition, 931 pages; 1,037 illustrations on 495 figures. Charles C Thomas, Publisher, Springfield, Ill., 1955. Price \$17.50.

This text is essentially a compilation of undergraduate lectures by the author, as presented at the University of Illinois College of Medicine. The subject matter is well organized and presented. The clear and adequate illustrations add tremendously to the elucidation of the procedures. A brief historical review of each section adds greatly to the interest and corrects many popular fallacious beliefs. For each section a brief but adequate review of the essential surgical anatomy is presented. Usually several different procedures to accomplish the same result are described, with the advantages and disadvantages of each enumerated. The chapters on the peritoneum and malformations of the intestinal tract are excellent and timely.

Some surgeons will want to be more radical in handling malignancies, particularly of the left colon, than is recommended by the author. The illustrations for repair of indirect inguinal hernia give the erroneous impression that the hernial sac is outside the spermatic cord. Several inconsequential errors in composition were noted; and at one point several lines are interchanged, which leads to considerable confusion. These errors should have been caught by more careful proofreading.

It is hard to draw a hard and fast line, but if we are to invade the realm of the gynecologist, one wonders if a work such as this should not include procedures on the kidney, ureter, bladder, adrenals, abdominal sympathetics, and great vessels, which certainly may be attacked by way of the abdomen.

In spite of these possible shortcomings, the clarity of the text and illustrations, plus adequate step-by-step detail, should make this book particularly valuable to the student, intern, and resident learning surgical technic, as well as a valuable reference for the busy surgeon who wishes to refresh his memory before undertaking a surgical procedure.

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SPLENIN A IN RHEUMATIC FEVER, The Testing of Splenin A as an Anti-inflammatory Agent, by Alvin F. Coburn, M. D., Lucile V. Moore, M. D., Judith Wood, M. D., and Mary Roberts, R. N. 87 pages. Charles C Thomas, Publisher, Springfield, Ill., 1955. Price \$3.75.

This book describes a study of the anti-inflammatory effect of Splenin A which was used in 47 cases of rheumatic fever in children. The method of making this splenin extract is described, a standard unit set up, and

a preparation usable intramuscularly and intravenously developed. Difficulties arose in making a product of lasting stability. The longest follow-up on the patients was three years, in which time they showed no adverse effect from the extract.

The effect on rheumatic fever of some substance in the spleen was postulated when it was noticed that splenectomy had an immediate adverse effect on the course of rheumatic fever in a patient with this disease. Two mutually antagonistic substances, named Splenin A and B, were found in the spleen by Ungar. Splenin A reduces capillary permeability and bleeding time and is found in rheumatic fever patients but not in those with rheumatic arthritis.

Clinical observations in the treated patients indicated an anti-inflammatory effect from Splenin A. However, the difficulties of producing a sufficient amount of the substance, which is not stored in the body in any quantity, and the small numbers of patients in this uncontrolled series leave Splenin A as a very interesting but not presently useful factor. As used in the past, splenic extracts of various sorts, like Pandora's box, have been the source of many disappointments, but hope still remains.—JAMES L. TOBIN, Col., USAF (MC)

CHLORPROMAZINE AND MENTAL HEALTH, Proceedings of the Symposium Held Under the Auspices of Smith, Kline & French Laboratories, June 6, 1955, Warwick Hotel, Philadelphia, Pa. 200 pages; illustrated; 25 tables. Lea & Febiger, Philadelphia, Pa., 1955. Price \$3.

This handy-sized, well-printed book contains a verbatim report of the papers presented and the discussion offered at a symposium held on chlorpromazine in June 1955 under the auspices of the manufacturer of the drug. Over 100 invited psychiatrists participated in this discussion. The discussants are, for the most part, very enthusiastic about this drug and support their remarks with adequate statistical material. However, there is one criticism one might lay against some of the discussants and that is, that although they usually had significant figures when dealing with schizophrenia, they included in the same tables material from the less common categories of mental disease in which the figures were really too small to be handled statistically.

Many of the projects described seem to have been controlled only by previous experience in the same ward setting. However, there were some other studies that seem to have been carefully controlled by the so-called "double blind" technic. In some of these reports the statistics were not as impressive: in one small group reported by one discussant, placebos, in the opinion of the ward attendants, had been more successful.

However, the general consensus of all the observers was that something very significant and frequently startling happened when chlorpromazine therapy was instituted. The change was particularly striking in the "back ward" situation.



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- POLICE DRUGS, by *Jean Rolin*, translated, with a foreword, by *Laurence J. Bendit*, M. A., M. D. (Cantab.), D. P. M. With an appendix on Narcotics analysis by *Edward V. Saber*. 194 pages. Philosophical Library, New York, N. Y., 1956. Price \$4.75.
- LABORATORY TESTS IN COMMON USE, by *Solomon Garb*, M. D. 160 pages. Springer Publishing Co., Inc., New York, N. Y., 1956. Price \$2.
- CLINICAL LABORATORY METHODS AND DIAGNOSIS, Volumes One and Two, by *R. B. H. Gradwohl*, M. D., D. Sc. 5th edition. Volume I, Chapters I to VI, pages 1-1220, 29 color plates, 295 figures. Volume II, Chapters VII to XVII, pages 1221-2452, 23 color plates, 470 figures. The C. V. Mosby Co., St. Louis, Mo., 1956. Price \$38.50 for two volumes.
- THE YEAR BOOK OF UROLOGY (1955-1956 Year Book Series), edited by *William Wallace Scott*, M. D., Ph. D. 398 pages; illustrated. The Year Book Publishers, Inc., Chicago, Ill., 1956. Price \$6.50.
- DISEASES OF THE NERVOUS SYSTEM, by *Sir Russell Brain*, Bt., D. M. (Oxon.), P. R. C. P. (London). 5th edition. 996 pages; illustrated. Oxford University Press, New York, N. Y., 1955. Price \$10.50.
- METABOLISM, PHARMACOLOGY AND THERAPEUTIC USES OF GOLD COMPOUNDS, by *Walter D. Block*, Ph. D., and *Kornelius Van Goor*, M. D. American Lecture Series, Publication No. 282, A Monograph in American Lectures in Dermatology, edited by *Arthur C. Curtis*, M. D. 76 pages. Charles C Thomas, Publisher, Springfield, Ill., 1956. Price \$2.75.
- CLINICAL STUDIES IN NEUROLOGY, by *Harry Lee Parker*, M. S., M. D., F. R. C. P. 1. 362 pages. Charles C Thomas, Publisher, Springfield, Ill., 1956. Price \$6.50.
- PROGRESS IN NEUROBIOLOGY: I. NEUROCHEMISTRY, edited by *Saul R. Korey*, M. D., and *John I. Nurnberger*, M. D., with twenty-three contributors. 244 pages; illustrated. Paul B. Hoeber, Inc., Medical Book Dept. of Harper & Bros., New York, N. Y., 1956. Price \$6.75.
- GESTATION, Transactions of the Second Conference, March 8, 9 and 10, 1955, Princeton, N. J., edited by *Claude A. Villee*, Ph. D. 262 pages; 118 illustrations. Josiah Macy, Jr. Foundation, New York, N. Y., 1956. Price \$5.
- THE NONVENEREAL DISEASES OF THE GENITALS, Etiology, Differential Diagnosis and Therapy, by *Fritz T. Callomon*, M. D., and *John F. Wilson*, M. D., M. S. 382 pages; 150 illustrations. Charles C Thomas, Publisher, Springfield, Ill., 1956. Price \$12.50.
- AMERICAN MEN OF SCIENCE, A Biographical Directory, edited by *Jaques Cattell*. 9th edition. Volume II, "Biological Sciences." 1,276 pages. The Science Press, Lancaster, Pa., and R. R. Bowker Co., New York, N. Y., 1955. Price \$20.
- THE NAVAL OFFICER'S MANUAL, by Rear Admiral *Harley Cope*, USN (Retired). 3d edition. A Ready Reference of Helpful Information and Counsel for All Officers of the United States Navy and the Marine Corps. 608 pages; illustrated. The Military Service Publishing Co., Harrisburg, Pa., May 1955. Price \$4.
- BRITISH MEDICAL BULLETIN, Volume II, Number 3, September 1955, "Surgery of the Heart and Thoracic Blood Vessels." 242 pages; illustrated. Published by the Medical Dept., The British Council, London W1, England. Distributed by Oxford University Press, New York, N. Y. 1955. Price \$2.75.

- SUBPHRENIC ABSCESS**, by *H. R. S. Harley*, M. S., F. R. C. S. American Lecture Series, Publication Number 255, A Monograph in The Bannerstone Division of American Lectures in Surgery, edited by *Michael E. DeBakey*, M. D., and *R. Glen Spurling*, M. D. Thoracic Surgery Division, edited by *Brian Blades*, M. D. 216 pages; illustrated. Charles C Thomas, Publisher, Springfield, Ill., 1955. Price \$7.
- SYNOPSIS OF GYNECOLOGY**, Based on the Textbook "Diseases of Women," by *Robert James Gossen*, M. D., F. A. C. S. 4th edition. 255 pages; 132 illustrations, including frontispiece in color. The C. V. Mosby Co., St. Louis, Mo., 1956. Price \$5.25.
- THE CERVICAL SYNDROME**, by *Ruth Jackson*, M. D., F. A. C. S. American Lecture Series, Publication No. 268, A Monograph in American Lectures in Orthopedic Surgery, edited by *Robert J. Joplin*, M. D. 130 pages; illustrated. Charles C Thomas, Publisher, Springfield, Ill., 1956. Price \$4.75.
- The Laboratory Diagnosis of COAGULATION DEFECTS**, by *Pietro De Nicola*, M. D. American Lecture Series, Publication No. 269, A Monograph in The Bannerstone Division of American Lectures in Pharmacology, edited by *Chauncey D. Leake*, Ph. D. 240 pages; 62 illustrations and 26 tables. Charles C Thomas, Publisher, Springfield, Ill., 1956. Price \$7.50.
- STRABISMUS**, Diagnosis and Treatment, by *Beulah Cushman*, M. S., M. D. 208 pages; illustrated. Lea & Febiger, Philadelphia, Pa., 1956. Price \$6.
- SKIN SURGERY**, by *Ervin Epstein*, M. D., and 17 contributors. 228 pages; 242 illustrations on 101 figures. Lea & Febiger, Philadelphia, Pa., 1956. Price \$7.50.
- Clinical Recognition and Management of DISTURBANCES OF BODY FLUIDS**, by *John H. Bland*, M. D. 2d edition. 522 pages; illustrated. W. B. Saunders Co., Philadelphia, Pa., 1956.
- ELECTROCARDIOGRAPHY**, Fundamentals and Clinical Application, by *Louis Wolff*, M. D. 2d edition. 342 pages; illustrated. W. B. Saunders Co., Philadelphia, Pa., 1956. Price \$7.
- THE NEUROSES IN CLINICAL PRACTICE**, by *Henry P. Laughlin*, M. D. 802 pages. W. B. Saunders Co., Philadelphia, Pa., 1956.
- SURVEY OF CLINICAL PRACTICE IN PSYCHOLOGY**, edited by *Eli A. Rubinstein*, Ph. D., and *Maurice Lorr*, Ph. D. Foreword by *Laurance F. Shafer*. 363 pages. International Universities Press, Inc., New York, N. Y., 1954. Price \$6.
- DOCTOR AND PATIENT AND THE LAW**, by *Louis J. Regan*, M. D., LL. B. 3d edition. 716 pages. The C. V. Mosby Co., St. Louis, Mo., 1956. Price \$12.50.
- THE ANNUAL SURVEY OF PSYCHOANALYSIS**, A Comprehensive Survey of Current Psychoanalytic Theory and Practice. Volume III. Edited by *John Frosch*, M. D., *Nathaniel Ross*, M. D., *Sidney Tarachow*, M. D., and *Jacob A. Arlow*, M. D. 682 pages. International Universities Press, Inc., New York, N. Y., 1956. Price \$10.
- "CONTROLLED HYPOTENSION" in ANESTHESIA and SURGERY**, by *David M. Little, Jr.*, M. D. American Lecture Series, Publication No. 283. A Monograph in The Bannerstone Division of American Lectures in Anesthesiology, edited by *John Adams*, M. D. 159 pages; illustrated. Charles C Thomas, Publisher, Springfield, Ill., 1956. Price \$4.50.



## Monthly Message

We are very happy to announce the formation of a Joint Committee on Aviation Pathology, a most important group. The establishment of this Committee required some several months inasmuch as it is a joint committee of the governments of Great Britain, Canada, and the United States. Although the Air Force of each country was fully in favor of this Committee and had met once or twice informally, in order to bring about maximum fulfillment of the possible functions, it was necessary to reach a formal agreement among our three countries. This has been accomplished. As many of you may not know, the first clue to the cause of the two Comet disasters in the Mediterranean over a year ago was by means of the ordinary autopsy which revealed evidence of explosive decompression in each body. An excellent report of this medical intelligence appeared in *Lancet* in June 1955 and this in turn was picked up by our popular magazine *True* in August 1955.

I wish to acknowledge my personal thanks to Wing Commander Bruce Harvey of the RAF, Wing Commander R. H. Lowry, CAF, and Dr. Howard Karsner, Consultant in Medical Research in the U. S. Navy, for their vision in realizing the need for this Committee and all that they have done in its organization. We fully expect that the recommendations and findings of the Committee will contribute greatly to our knowledge of the causes of fatal airplane accidents, in which pilot failure for one reason or another is too frequently a primary factor.

*Frank B. Berry*

FRANK B. BERRY, M. D.  
Assistant Secretary of Defense  
(Health and Medical)

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## Foreword

The *United States Armed Forces Medical Journal* is the medium for disseminating information of administrative and professional interest to all medical personnel of the Department of Defense. The Assistant Secretary of Defense (Health and Medical) and the Surgeons General of the several services invite all medical officers, dental officers, Medical Service Corps officers, Nurse Corps officers, and officers of the Veterinary Corps of the Armed Forces, and the medical consultants of the Army, Navy, and Air Force to submit manuscripts for publication in this *Journal*.

FRANK B. BERRY, M. D.,  
*Assistant Secretary of Defense (Health and Medical).*

MAJOR GENERAL SILAS B. HAYS,  
*Surgeon General, United States Army.*

REAR ADMIRAL BARTHOLOMEW T. HOGAN,  
*Surgeon General, United States Navy.*

MAJOR GENERAL DAN C. OGLE,  
*Surgeon General, United States Air Force.*

# UNITED STATES ARMED FORCES MEDICAL JOURNAL

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## COMMON RESPIRATORY DISEASE IN ARMY RECRUIT POPULATIONS

An Epidemiologic Study

FRATIS L. DUFF, *Colonel, USAF (MC)*

**T**HE GREATEST single cause for admission of armed services personnel to medical treatment facilities is a group of acute diseases affecting the upper respiratory tract which, in military morbidity reports, are grouped under the term "common respiratory disease." Even though only a brief period of disability is experienced, common respiratory disease produces more time lost from duty than any other cause except injuries. Approximately six per cent of all days lost from duty is due to these conditions.<sup>1,2</sup>

The greatest impact made by common respiratory disease upon military populations has been during periods of mobilization for war. Young adults mobilized into the military forces of the United States are particularly susceptible to these diseases during the first months of military service. Epidemics of common respiratory disease frequently occur when large numbers of these recruits are concentrated in military training camps.<sup>3-5</sup>

During the period of World War II (1942-1945), from a mean strength of 6,076,000 there were 4,086,000 admissions for common respiratory disease recorded by the U. S. Army. The average time lost from duty by a person admitted for treatment of common respiratory disease during this period was 6.5 days.<sup>6</sup> These four million cases during the war period thus resulted in approximately 265 million man-days lost from duty, or an average of approximately 18,000 persons absent from duty each day of the war.

Review of the total Army experience with common respiratory disease during the mobilization and war period (fig. 1) reveals that the highest reported incidence was during the winter of 1940-1941, when the National Guard divisions were being mobilized.<sup>7</sup> Similar epidemics of lesser magnitude occurred during the following three winters. The sharp epidemic during the winter of 1942 was due to influenza which appeared in November of that year in both civilian and military populations and rapidly spread over the United States, causing explosive epidemics in many Army camps.<sup>8,9</sup> Following this epidemic, the incidence of common respiratory disease underwent a marked and progressive decline throughout the remainder of the war.

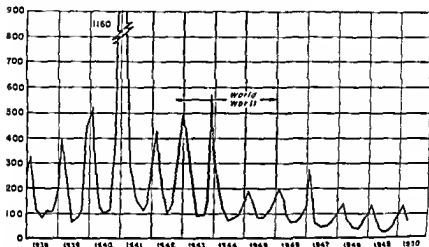


Figure 1. Common respiratory disease and influenza from 1938 to 1950 (admission rates per 1,000 troops per year) from monthly statistical health reports.

One element of the composition of the Army that closely paralleled the incidence of common respiratory disease was the proportion of recruits to the total number of Army troops.<sup>7</sup> These data revealed a positive correlation between the percentage of enlisted men with less than six months' service and the incidence of common respiratory disease. The epidemics experienced during the mobilization period and the first two years of the war occurred when a large proportion of Army personnel was composed of recruits, and the marked reduction in incidence occurred when a very small proportion of Army troops consisted of recruits. It would appear that the high common respiratory disease rates reported during the first years of the war were in large part due to epidemics among recruits.

A study of the experience of U. S. Army troops with common respiratory disease in the various theatres of operation revealed

outstanding differences in the monthly incidence reported from the various geographic areas.<sup>7</sup>

In the Alaskan, North American, and European Theatres of Operation the incidence increased markedly during the winter season, frequently to epidemic proportions, and the total four-year rate was high. In the tropical and subtropical areas of Latin America and the Southwest Pacific and Pacific Ocean Theatres there was an almost complete absence of seasonal variation, and the rate remained at a very low level throughout the war period.

Common respiratory disease among Army troops in the continental United States was a problem of major importance, the total rate for the four-year period being 192 cases per 1,000 troops per year.

The variation in seasonal peaks and total incidence observed in the northern and southern overseas theatres was also apparent in the admissions reported from geographic subdivisions or service commands in the continental United States. The highest incidence and the greatest increases during the winter months were observed in the Second, Fifth, Sixth, and Seventh Service Commands, composed of the northern and northeastern states. The lowest incidence and the smaller seasonal variations were observed in the southern and southwestern states of the Fourth, Eighth, and Ninth Service Commands.<sup>7</sup>

These data suggest that there is a factor or factors in the northern overseas areas and in the northern part of the United States which apparently enhances the transmission of common respiratory disease and that this element is less prevalent or less effective in the southern areas of the United States and almost completely absent in the tropical and subtropical overseas areas.

Several carefully controlled studies conducted during the war period have demonstrated that recruit populations experienced severe epidemics of common respiratory disease if assembled during the winter months.<sup>4, 5, 10</sup> Sartwell,<sup>3</sup> in a study of recruits at Fort Dix, N. J., conducted after the war, observed severe epidemics among recruit units assembled in January and February. Units formed in the fall and early winter did not experience severe epidemics early in the training period or during the following January or February, when the newly arrived units were having sharp epidemics. These studies and others<sup>7</sup> demonstrate that recruit units show marked increases in common respiratory disease rates during the first weeks of military service and that severe epidemics are experienced by such groups if they are assembled during the winter season.

There are, therefore, indications that recruit units assembled during a season of low common respiratory disease incidence do not experience epidemics at that time or during subsequent winter seasons. This effect has not, however, been clearly demonstrated since the period of observation in the basic training centers has not been of sufficient duration to follow these recruit groups throughout the entire year.

There apparently is a "seasoning" process which operates in recruit units to make the personnel more resistant to common respiratory disease, as measured by admissions to medical treatment facilities. It has not been demonstrated whether this seasoning is dependent upon the individual's having experienced the disease or is accomplished by the intimate intermingling of recruits and incident to the increasing length of service and adjustment to military life. It has not been clearly demonstrated whether or not recruit groups may become seasoned without experiencing extensive epidemics of common respiratory disease and enormous loss of manpower from vital training duties. In order to answer these questions it is necessary that recruit populations be observed for periods of time longer than those of previous studies. These observations should extend throughout the first year of service.

The previous studies have been made on different recruit units, all of which were assembled in the same geographic location. No comparisons have been made between recruit units in different geographic areas during the same season so as to determine the effect of geographic location as well as season upon recruit epidemics. Observations should therefore be of recruit populations assembled in various seasons of the year and in different geographic locations during the same season of the year.

It appeared that the Army divisions of World War II were large recruit populations that could be followed from time of assembly through the various phases of military service. Army divisions are tactical organizations composed of approximately 15,000 individuals. They were assembled in different geographic areas throughout the United States for training and then deployed to theatres of operation.

These divisions were of three different types: Regular Army divisions, National Guard divisions, and Army of the United States or Organized Reserve divisions.

Prior to the war there were seven incompletely manned Regular Army divisions. Seven additional divisions were activated during 1940 and 1941, and the old divisions brought up to strength. The new divisions were formed with cadres of varying sizes from

the old divisions, and then were brought up to strength with personnel primarily from the reception centers.<sup>11</sup>

The National Guard divisions existed prior to the war as state organizations. Units of the divisions were organized by the cities and towns throughout the state or states. The units assembled weekly in the local community for training purposes, and the division as a whole assembled once a year in the summer for two weeks of field training. The National Guard divisions were called into the Federal service during 1940 and 1941. Personnel from the local units were rapidly assembled as a division and then moved to an Army camp for training. Necessary filler personnel were supplied from recruit stations or induction centers. The National Guard divisions were large recruit populations with all personnel having the same length of military service. The personnel of the division came directly from civilian life and from the same geographic area, *i. e.*, the same state or adjacent states.

The Army of the United States and Organized Reserve divisions were activated during 1942 and 1943.<sup>11</sup> These divisions were created according to a plan which was developed in January 1942.<sup>12</sup> Each new division was assembled around a cadre of 159 officers and 1,190 enlisted men drawn from the older divisions or from replacement training centers. The bulk of the troops (13,425 enlisted personnel) came into separate divisions over a period of two to three weeks, directly from reception centers.<sup>12</sup>

Premobilization plans had contemplated replacement training centers as an integral part of the process of mobilization. These centers were designed to provide basic training of three to four months' duration for all persons before their assignment to divisions. With the declaration of war in December 1941, it was decided not to expand these centers commensurate with the great expansion of the Army. Graduates from the replacement training center were used as replacements for units overseas or alerted for overseas and as cadres for new divisions. In many instances the flow through these centers was insufficient to fulfill these requirements.<sup>12</sup>

Filler personnel for new divisions came directly from reception centers. These centers were located in various areas of the United States, and received inductees from civilian life for processing. In the induction center the recruits received administrative processing, uniforms, and assignment to a training unit or to a newly activated division. The men were usually retained in the induction center less than one week. Thus the newly activated divisions were composed primarily of recruits coming from many different areas of the United States.

This study was conducted on the experience of these Army divisions with common respiratory disease during World War II in order to demonstrate certain epidemiologic features of these diseases in large military recruit populations. A primary aim of the study was to demonstrate those epidemiologic features which might be useful in the development of practical methods for the reduction of common respiratory disease in military populations, particularly during periods of rapid mobilization.

### SOURCE OF DATA

A search through the files of the Adjutant General's Historical Record Depot revealed medical records complete through the first year of service for 10 divisions. The incidence of common respiratory disease has been followed each month from the time of assembly through the first year, and for some units throughout the war period. The admissions to hospital or quarters for common respiratory disease and the mean strength have been obtained from the original weekly Statistical Health Report. The data from these reports are a reliable guide to the trends in morbidity and may be used for comparison with other data from the same source.<sup>1</sup> The monthly incidence is expressed as admissions per 1,000 troops per year.

Frequently there were delays of varying length from the date of the official activation order until the filler personnel of the unit were assembled. Therefore, the study of each division is dated from the time of the assembly of the personnel rather than from the date of the official activation order.

The term "common respiratory disease" is used in the Army, and has been used in this study, to designate those diseases of the upper respiratory tract for which no causative agent is identified. A great number of diagnostic terms are used to describe these conditions. The most frequently used are acute catarrhal nasopharyngitis, acute catarrhal pharyngitis, acute catarrhal bronchitis, acute laryngitis, common cold, and acute respiratory infection, all of which are grouped together in Army morbidity reports as common respiratory diseases.

Those cases diagnosed as influenza are reported separately. In the compilations made by the Surgeon General's Office and in this study, influenza is included with common respiratory disease because of the confusion and lack of definitiveness which arise in the clinical diagnosis of this condition during nonepidemic periods and the tendency to diagnose most acute respiratory diseases as influenza during epidemic periods.

The incidence data used in this study are calculated from the cases of men admitted to hospital or quarters for treatment. Studies conducted by the Commission on Acute Respiratory

Diseases of the Army Epidemiological Board demonstrated an increased incidence during late summer and fall of a mild respiratory disease usually treated in the dispensary without hospitalization.<sup>13, 14</sup> The epidemiologic pattern of this minor respiratory disease differed from that of the more severe respiratory diseases necessitating hospitalization. The more severe respiratory diseases of unknown cause commonly producing large numbers of hospitalizations in recruit populations were called "undifferentiated acute respiratory disease" and commonly referred to as "ARD" by the Commission on Acute Respiratory Disease in their studies during World War II.<sup>5</sup> It would appear that a large proportion of the cases of acute respiratory disease in recruit populations necessitating hospitalization and reported under the Army classification of common respiratory disease was of the type studied by the Commission and termed ARD.

Recently there have been reports of isolation of a new group of viruses that are closely associated with the type of acute respiratory disease called ARD.<sup>15, 16</sup> The isolation of these agents gives some hope of identification of the causative agent of the acute respiratory illness which commonly produces epidemics in military recruit organizations. The identification of this agent will make possible more detailed studies and enhance the development of control measures.

### EPIDEMIOLOGIC OBSERVATIONS

#### Divisions Assembled in Winter of 1940-1941

Records are available on four National Guard divisions assembled during the winter of 1940-1941. The 35th Division assembled in January 1941, the 26th Division assembled in February, the 33d Division in March of that year, and the 30th in October 1940. The monthly incidence of common respiratory disease and mean strength for these units is shown in figures 2 and 3.

The 35th Division was composed of troops from Kansas, Missouri, and Nebraska. Troops from these three states were assembled at Lincoln, Nebr., in January 1941 and then moved to Camp Robinson, Ark., for training.

At the time of the initial assembly of the division and during the build-up to full division strength in January and February, the unit experienced common respiratory disease in epidemic proportions. The initial medical report revealed rates of 3,100 per 1,000 troops per year. This excessive incidence of respiratory disease decreased rapidly during the first four months and after the unit became stabilized at Camp Robinson, Ark., the rates were approximately 200. This unit did not again experience an epidemic of common respiratory disease. The seasonal in-





creases in the unit reported during the subsequent winter seasons were less than the rates reported by total Army troops in that area. The movement of the division to the Louisiana maneuver areas, and later to California, produced no marked effect upon the common respiratory disease rates. The marked reduction in strength during early 1942 was due to the formation of cadres for the new divisions being activated at that time. The replacement of these losses during the summer months at Camp Rucker, Ala., produced no marked effect upon the incidence of common respiratory disease reported at that time or during the subsequent winter months.

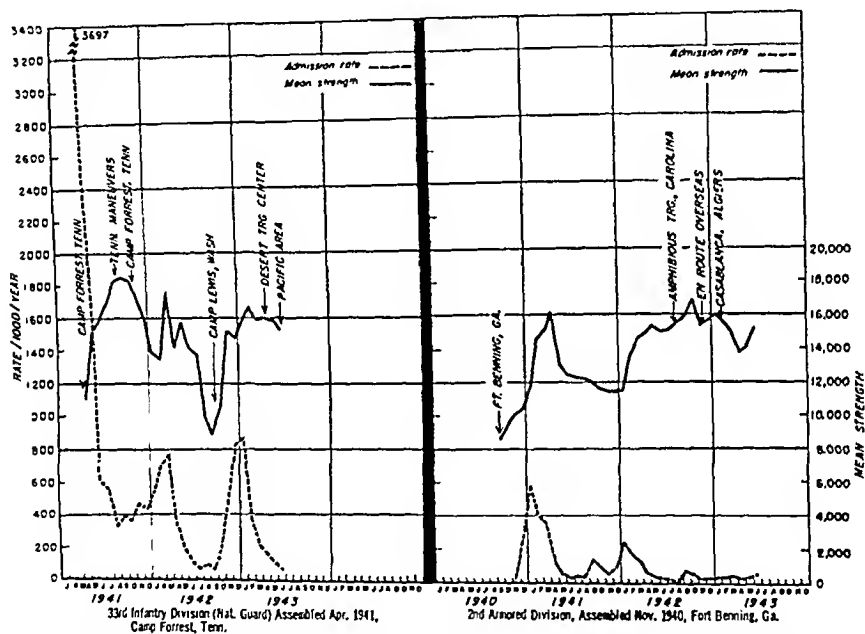


Figure 3. Admission rates for common respiratory disease and influenza and monthly mean strength for two divisions assembled during the winter of 1940-1941.

The other National Guard divisions assembled in the northern states showed similar epidemic patterns. The 26th Division, Massachusetts National Guard, was assembled at Camp Edwards, Mass., in February 1941. This unit also had a severe epidemic when first assembled, with a rate of 3,415 per 1,000 troops per year reported at that time. After this epidemic the common respiratory disease rates remained at a low level with only a small seasonal increase during the second winter. This unit moved several times during the latter part of the first year of service—to the Massachusetts maneuver area, to North Carolina, and back to Massachusetts. Medical records are available only for the first year and a half of service.

The 33d Division was composed of troops from the state of Illinois and was assembled at Chicago, Ill., in March 1941. It should be noted that this area was in the Sixth Service Command, which reported the highest common respiratory disease rates for the war period.

At the time of assembly the troops of the unit experienced a very severe epidemic, reporting a rate of 3,697 per 1,000 troops per year. This unit reported higher seasonal increases of common respiratory disease in subsequent winters than did the other two units, although these increases were approximately the same as those reported by all Army troops in that area. These winter peaks occurred at the time the unit received large numbers of filler personnel as replacements for cadres furnished to other divisions. The effect of the addition of new recruits to organizations of seasoned men in increasing respiratory disease rates was observed by the Commission on Acute Respiratory Diseases in their studies at Fort Bragg.<sup>2</sup> This Division moved from Camp Forrest, Tenn., to the Tennessee maneuver area, and during the second year of activation to Fort Lewis, Wash., to the Desert Training Center, and then to the Pacific area.

The 39th National Guard Division, with troops from North and South Carolina, Georgia, and Tennessee, was assembled at Fort Jackson, S. C., from October 1940 through January 1941. The assembly of this recruit population at this time produced an epidemic of common respiratory disease with a peak rate of 2,174 per 1,000 troops per year being reported in January 1941. This epidemic was of short duration, and the rate fell to a low level and then followed the pattern observed in the other divisions. This unit trained at Fort Jackson, S. C., and the Tennessee and Carolina maneuver grounds, and then moved to Camp Blanding, Fla. This division, assembled in the winter season but in a more southern state, experienced a typical recruit epidemic but of much lower magnitude than the National Guard divisions assembled in the northern states.

Records are available for the Second Armored Division, which was assembled at Fort Benning, Ga., in November 1940. This unit was built up rapidly from a cadre to full division strength during December 1940 and January of 1941. This rapid influx of personnel produced an increase in the incidence of common respiratory disease to a rate of approximately 600 per 1,000 troops per year. Following this minor epidemic the incidence of common respiratory disease in this unit remained at a very low level for the next two years.

This unit is not strictly comparable to the National Guard divisions as the personnel were not all recruits from the same geographic area, and the division was activated in a different

manner. The unit did, however, increase 100 per cent in strength by the addition of filler personnel during the build-up phase. This unit, assembled in Georgia, did not experience an epidemic of common respiratory disease at the time of assembly of the troops or during the two subsequent winter seasons. The movement of the unit to other areas in the United States and overseas had no marked effect upon the common respiratory disease rate.

### **Divisions Assembled in Summer of 1942**

Medical records are available on five divisions assembled during the summer of 1942 (figs. 4 and 5). The 89th Division was activated at Camp Carson, Colo., the 95th Division at Camp Swift, Tex., the 81st Division at Camp Rucker, Ala., the 77th Division at Fort Jackson, S. C., and the 85th Division at Camp Shelby, Miss.

Patterns of the monthly common respiratory disease incidence in the divisions assembled in Texas, Alabama, and South Carolina were very similar. These units showed only slight increases in incidence at the time of assembly of the personnel. Subsequent winter seasons were characterized by seasonal increases of low magnitudes.

The 95th Division was assembled in July at Camp Swift, Tex., and trained in Texas, Louisiana, and the Desert Training Center. This unit then moved to Indiantown Gap, Pa., in January and February of 1944 and after a period of training was shipped to England. The movement into a northern state during the winter season did not cause an appreciable increase in the reported incidence of common respiratory disease.

The 81st Division was assembled in June at Camp Rucker, Ala., and spent the first year training at this location. The unit then moved to the Tennessee maneuver area, to the Desert Training Center, and later to California. These movements had no effect upon the reported incidence of common respiratory disease.

The 77th Division was assembled at Fort Jackson, S. C., in March 1942. The increase in common respiratory disease at the time of assembly was much less than the increase noted in the 30th Division assembled at the same place during the preceding winter months. This unit trained in the Louisiana maneuver area, the Desert Training Center, and Camp Pickett, Va., and was then shipped to the Pacific area. Medical records are available for the period that the unit was in Okinawa, regrouping in the Philippines, and entering Japan for occupation duty. During these periods of training and combat duty, seasonal increases of low magnitude in common respiratory disease were reported.

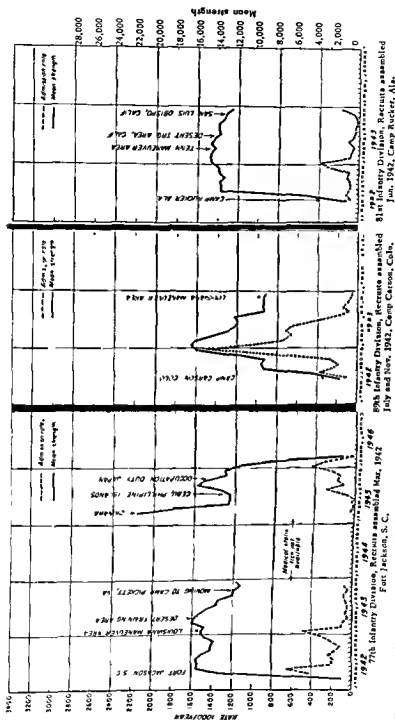


Figure 4. Admission rates for common respiratory disease and influenza and monthly mean strength for three divisions assembled during the summer of 1942.

The 89th Division was assembled in July 1942 at Camp Carson, Colo. This unit was initially formed by approximately 9,000 personnel during July and August. A small increase in the common respiratory disease incidence was observed at that time. During November and December the unit was brought to full division strength of approximately 16,000 personnel by the addition of recruits. At this time there was a marked increase in common respiratory disease, and rates in excess of 1,500 per 1,000 troops per year were reported. These rates did not show the rapid decline that was observed in recruit epidemics of other units, and high rates were reported through July of the following summer. An appreciable amount of scarlet fever was reported from the unit during this period.

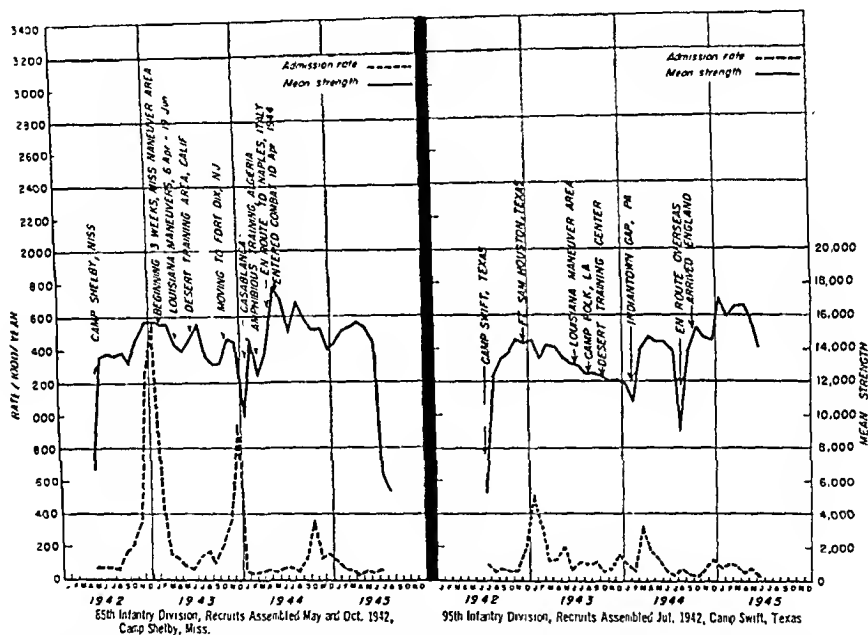


Figure 5. Admission rates for common respiratory disease and influenza and monthly mean strength for two divisions assembled during the summer of 1942.

The epidemic pattern of this unit was influenced by two factors. Army units stationed in Colorado during and after the war have consistently reported excessively high rates of streptococcal disease.<sup>6</sup> Characteristically, the high incidence of these diseases has been prolonged into late spring or early summer. This disease reported as common respiratory disease may have accounted for the prolongation of the high rates which produced an excessive yearly rate for the first year of training. This is suggested by the occurrence of scarlet fever in the unit.

The sharp epidemic reported during November and December was influenced by the assignment of approximately 6,000 recruits to this unit at that time. Medical records for the second winter following activation were not available. The rates for December of the second winter, however, were low.

Medical records of the 85th Division also demonstrate the effect of the addition of a large number of recruits to a unit during the winter months. This unit was formed by the assembly of approximately 13,000 personnel in May at Camp Shelby, Miss. No increase in common respiratory disease was reported during the summer months. During October and November approximately 3,000 inductees entered the division and a sharp epidemic occurred in December and January. The peak incidence in the second winter season was influenced by influenza present at that time but was approximately the same as that reported by total Army troops in the area in which the division was stationed.

Three divisions which assembled during the summer months in the southern part of the United States did not experience recruit epidemics during the first few months of training or during the subsequent winter season, even after moving to less favorable geographic areas.

Two of these divisions had two periods during which the personnel were assembled. The initial formation of the division during the summer months did not produce epidemics of common respiratory diseases. The addition of large numbers of inductees to those units during the winter months did, however, produce sharp epidemics. The high incidence in the unit assembled in Colorado was prolonged into the summer months, thus producing a high rate during the first year of service.

#### **Divisions Assembled in Winter of 1942-1943**

Records are available from six divisions activated during the winter of 1942-1943 (figs. 6-8).

The 94th Division was officially activated at Camp Custer, Mich., in November 1942 and almost immediately moved to Camp Phillips, Kans., where most of the personnel were assembled in November and December. Common respiratory disease rates rose in epidemic manner to about 2,400 per 1,000 troops per year within the first three months and then fell to a low level. A seasonal rise of lesser magnitude was experienced during the winter of 1943-1944. This unit trained in the Tennessee maneuver area and then at Camp McCain, Miss.

The 83d Division was assembled during October and November 1942 at Camp Atterbury, Ind. A typical recruit epidemic with rates of approximately 2,000 occurred at that time. This epidemic was of short duration and the common respiratory disease





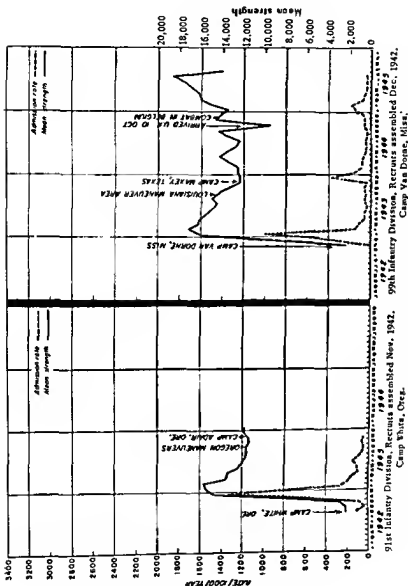


Figure 7. Admission rates for common respiratory disease and influenza and monthly mean strength for two divisions assembled during the winter of 1942-1943.

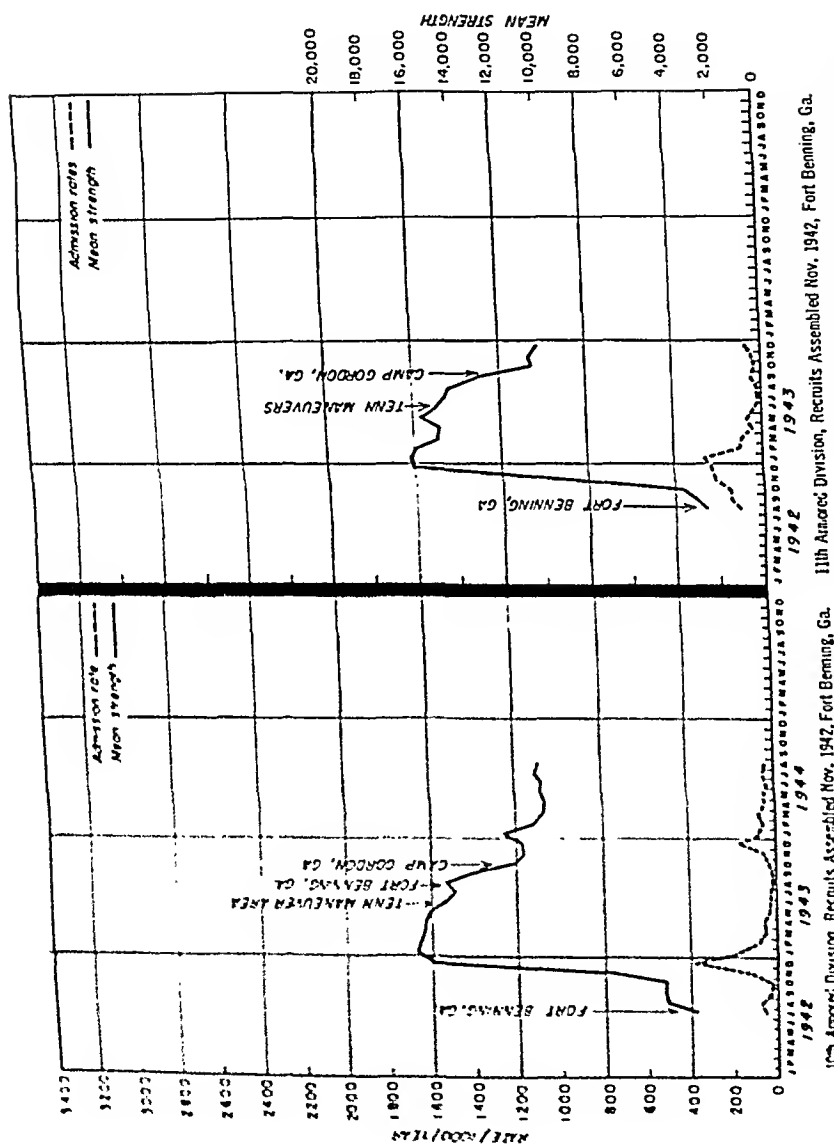


Figure 8. Admission rates for common respiratory disease and influenza and monthly mean strength for two divisions assembled during the winter of 1942-1943.

rates decreased to a low level throughout the remainder of the first year following activation. During the winter of 1943-1944 a normal seasonal increase was recorded. This unit trained at the Tennessee maneuver area and Camp Breckenridge, Ky., and was then shipped to the European Theatre of Operations. Medical records are not available for the period during the movement to England and during the invasion of the continent. During the winter of 1944-1945 when the division was engaged in field operations on the European continent a minor seasonal rise of respiratory disease was reported.

The 91st Division assembled at Camp White, Oreg., in November 1942. The strength increased very rapidly during this month and there occurred a marked increase in common respiratory disease with rates of approximately 1,300 per 1,000 troops per year during December. Following this epidemic, low rates were sustained throughout the remainder of the first year of service. The unit participated in the Oregon maneuvers and then moved to Camp Adair, Oreg., in the fall of 1943.

The 99th Division was initially formed at Camp Van Dorn, Miss. The personnel were assembled in November and December 1942. An increase in common respiratory disease was reported at that time with a rate of approximately 1,000 per 1,000 troops per year during January 1943. The rate fell rapidly to a very low level, which was maintained throughout the summer months. A normal seasonal increase was reported during the subsequent winter season. This unit trained in Mississippi and Texas and then moved to the European Theatre and into combat in Belgium. Those movements produced no increase in the common respiratory disease rates.

Two divisions, the 10th and 11th Armored Divisions, were both activated at Fort Benning, Ga., and have practically the same epidemic patterns. These units were both assembled in November and December 1942. At this time a minor increase in common respiratory disease incidence was reported. During the second winter, while these units were in training, only small seasonal increases occurred. It is of interest that these two units, assembled at the same time and in the same geographic area, demonstrated an almost identical experience with common respiratory disease.

Of the six divisions assembled during October, November, and December 1942, two were assembled in northern states. These units, assembled in Kansas and Indiana, experienced marked epidemics of common respiratory diseases during the first three months of service. The three divisions assembled in Mississippi and Georgia during the same season did not experience epi-

demics. The unit assembled in Oregon reported common respiratory disease rates between these two extremes.

### Divisions Assembled During 1943

Records are available for three divisions assembled during 1943 (fig. 9). The 106th Division assembled during March at Fort Jackson, S. C.; the 63d Division assembled in August and September at Camp Van Dorne, Miss.; and the 16th Armored Division assembled during July at Camp Chaffee, Ark. These units were all formed in southern states; records are not available for units formed in the north at this time.

These units all exhibit epidemic patterns similar to those observed in other units assembled in the southern states in that slight to moderate increases in the incidence of common respiratory disease occurred at the initial assembly of the troops. During the subsequent winter season, moderate seasonal peaks comparable to those of all Army troops in that area were reported.

### FINDINGS

Table 1 shows the common respiratory disease rates of the 19 Army divisions assembled during different seasons and in various geographic areas. The total respiratory disease rates for the first three months, the first year, and the second year of military service are tabulated.

These data and the charts of the divisions show that the units assembled during the winter seasons of 1940-1941 and 1942-1943 experienced high common respiratory disease rates during the first three months of service. Of these units, those assembled in the northern states reported severe epidemics while those assembled in southern states reported increases in common respiratory diseases of lesser magnitude. The total incidence of these diseases during the first year is influenced greatly by the magnitude of the recruit epidemics. Divisions assembled in the winter season in northern states reported high incidence for the first year, while the total first year's incidence for those assembled in southern states was low.

Divisions completely assembled during the summer months did not experience recruit epidemics at that time or during the subsequent winter season. The total incidence for the first year of service was low. Two divisions, the 85th and the 89th, experienced moderate epidemics with the addition of large numbers of recruits during the winter months. Those epidemics produced a high rate for the first year in these two units. The prolongation of high rates into the summer months and a high noneffectiveness from common respiratory disease during the first year occurred in the 89th Division assembled in Colorado.

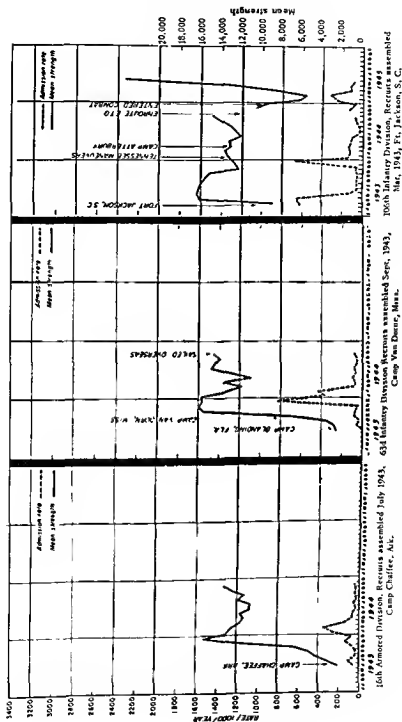


Figure 9, Admission rates for common respiratory disease and influenza and monthly mean strength for divisions assembled in 1943.

TABLE 1. *Common respiratory disease in U. S. Army Divisions\**

Period when divisions assembled	Division	Assembled		Common respiratory disease rate (on annual bases)		
		Month	Place	1st 3 mo	1st yr	2d yr
Winter of 1940-1941	26th	Feb.	Mass.	2,461	604	177
	35th	Jan.	Ark.	2,329	694	123
	33d	Apr.	Tenn.	1,689	751	344
	30th	Oct.	S. C.	377	448	239
	2d	Nov.	Ga.	366	195	73
Summer 1942	77th	Mar.	S. C.	449	271	104
	89th	Jul.-Nov.	Colo.	253	710	125
	81st	Jun.	Ala.	82	132	52
	85th	May-Oct.	Miss.	71	430	174
	95th	Jul.	Tex.	69	165	125
Winter of 1942-1943	94th	Nov.	Mich.	1,466	411	**
	83d	Oct.	Ind.	1,187	365	**
	91st	Nov.	Oreg.	727	272	**
	99th	Dec.	Miss.	575	183	84
	10th	Nov.	Ga.	266	89	65
	11th	Nov.	Ga.	239	91	**
1943	106th	Mar.	S. C.	440	216	100
	16th	Jul.	Ark.	270	106	**
	63d	Sept.	Miss.	36	242	**

\* Arranged in descending order of first three months' rate.

\*\* Data not available.

Common respiratory disease rates for the second year of service is of the same order of magnitude for all of the units. The higher rate of the 33d Division during this period was produced by the addition of approximately 6,000 recruits to the unit in October and November of the second winter when the unit was stationed at Fort Lewis, Wash.

The sharp increase in rates shown by many of these units during November and December 1943 was due to influenza which appeared in many Army camps at that time.<sup>8,9</sup>

#### DISCUSSION

Previous studies<sup>4,5</sup> have demonstrated the absence of recruit epidemics in recruit populations assembled in the late summer and fall seasons. It was stated, however, that the increase in common respiratory disease during the following winter months produced a total common respiratory disease rate that was equal to the total rates of those units assembled during the winter



apparently become seasoned after four to six months. It has been demonstrated that recruit groups experience epidemics of common respiratory disease if assembled in northern states during the winter season. This study also demonstrates that units may become seasoned with respect to common respiratory disease without experiencing severe epidemics of these diseases, by assembling the recruits in the summer season or in southern states during the winter season.

The mechanism of this process of seasoning in respect to common respiratory diseases is not clear. Studies of the epidemiology of common respiratory diseases and attempts to cultivate the causative agent in different laboratories indicated that there may be several types or strains of agent.<sup>15-19</sup> Studies have indicated that the active immunity developed after exposure to these agents is probably strain-specific and of short duration.<sup>19-22</sup> Each of the strains may produce clinical illness in an individual not recently exposed to that particular strain.

The epidemiology of common respiratory disease in military organizations might be explained on the basis of these observations. The military organizations observed in this study were formed by the assembly of individuals from many geographic areas of the United States, both rural and urban. This method of formation of the units would have brought together many different strains of the causative agent of common respiratory disease, and exposed individuals in the units to many strains not previously encountered. These exposures under favorable conditions would produce infection in a large number of these individuals with a resultant immunity which would be of short duration. The immune status, however, would receive constant stimulation through continued exposure resulting from the constant close association which is so characteristic of military life. In this manner, the men would become resistant to many strains of the causative agent and become seasoned troops with respect to common respiratory disease.

The exposure to many strains of the causative agent under the conditions that exist in the assembling of units in northern states during the winter months does apparently produce infections of sufficient severity to cause large numbers of persons to be admitted to the hospitals for medical treatment. Thus recruit epidemics, as measured by hospital admission, were observed in these units.

Exposures under conditions that exist during the summer months or in units assembled in southern states during the winter season apparently produce an increased proportion of mild, sub-clinical attacks. Recruit epidemics, measured by hospital admissions, either did not occur or were much less extensive in



season with resulting recruit epidemics. The longest period of observation of these training units was 17 weeks.

Sartwell's studies at Fort Dix have demonstrated that units assembled in the fall without severe recruit epidemics did not experience excessive common respiratory disease rates during subsequent winter months. These observations were for a period of only 14 weeks.

In this study it has been possible to follow large Army units throughout the first year of service and for some units through the second year of service. These data demonstrate that large recruit populations were assembled without epidemics of common respiratory disease if assembled during the summer months, and that they did not experience epidemics during the subsequent winter season. The total common respiratory disease reported by these units during the first year following activation was approximately one fourth that of the units that experienced recruit epidemics by being assembled during the winter season in the northern states.

The divisions assembled in the winter in the northern states consistently experienced severe recruit epidemics. The units assembled in southern states during the winter months reported increased common respiratory disease at the time of assembly but did not experience the severe epidemics as did the units assembled in the northern states. The total common respiratory disease for the first year of service of these units assembled in the south was likewise of a lower order of magnitude.

It might be argued that the avoidance of epidemics during the first year by activation of units under favorable seasonal and geographic conditions merely postpones the epidemics until less favorable circumstances are encountered. Many of the units studied did move to different geographic areas after the first year of training. Despite these movements, the common respiratory disease rates after the first year were uniformly low. This is illustrated by the 95th Division, which assembled in Texas during the summer without experiencing a recruit epidemic, and reported only a normal seasonal increase in common respiratory disease upon moving to Indiantown Gap, Pa., during January and February of the second winter season following activation.

The process by which individuals entering Army organizations become more resistant to certain diseases and adjusted to military life is termed seasoning. This seasoning process includes the development of resistance to common respiratory disease, as illustrated by the experience of the divisions studied and by the experience of the total Army during the war period.<sup>7</sup> Troops

apparently become seasoned after four to six months. It has been demonstrated that recruit groups experience epidemics of common respiratory disease if assembled in northern states during the winter season. This study also demonstrates that units may become seasoned with respect to common respiratory disease without experiencing severe epidemics of these diseases, by assembling the recruits in the summer season or in southern states during the winter season.

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Exposures under conditions that exist during the summer months or in units assembled in southern states during the winter season apparently produce an increased proportion of mild, sub-clinical attacks. Recruit epidemics, measured by hospital admissions, either did not occur or were much less extensive in

these units. In this manner the communal immunity or seasoning was developed without large numbers of hospital admissions and excessive loss of time from duty. The reason for this difference is not apparent. It suggests very strongly that there is a climatic factor which alters the host-parasite reaction. To each assembly point recruits came from various parts of the country, were processed in a similar manner, and were subjected to the same conditions of living in military life. By this process there was opportunity for viral agents of all types to be introduced. Whether the climatic factor operates on the selection of the prevalent viral strains, affects their dispersibility, or modifies the host reaction toward mildness in the warmer regions remains a problem for future investigators to solve.

### SUMMARY

The experience of the United States Army during World War II has demonstrated that common respiratory diseases are a most important cause of noneffectiveness resulting from diseases. Those diseases exert their greatest effect upon military populations during periods of mobilization, when large groups are being assembled from civilian life.

Common respiratory diseases reported by all Army units, and particularly by troops in the continental United States, revealed very high yearly rates and epidemic peaks during the winter months of the mobilization phase and the first two years of the war. During the last two years of the war the rates were greatly reduced and the seasonal peaks were of small magnitude. The correlation of the proportion of recruits in the Army with the common respiratory disease rates suggests that the excessive rate experienced during mobilization and the early part of the war was produced by the large number of recruits present at that time.

The Army's experience with common respiratory diseases in the various foreign theatres of operation and in the geographic subdivisions of the United States has demonstrated a definite seasonal and geographic effect upon the reported incidence of these diseases. In the northern areas the yearly incidence and the increase in incidence during the winter season were of much greater magnitude than in the southern areas.

Because epidemics of common respiratory diseases in recruit populations contribute a major part to the total Army's experience with these diseases, an inquiry into the effect of geography and season upon these diseases in large recruit populations has been conducted by the study of 19 Army divisions.

The method of activation of divisions by assembling the personnel directly from civilian life produced large recruit popula-

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tions. It has been possible to follow these groups with respect to common respiratory diseases through the first year of service or longer.

This method of study has made possible the observation of very large recruit populations in various seasons of the year and in different geographic areas of the United States.

These observations reveal that geography, season, and length of military service have a distinct influence upon the incidence of common respiratory disease in Army populations, as measured by admissions to medical treatment facilities.

The highest incidence was reported during the first three or four months of service. After this period all units studied became seasoned with respect to common respiratory disease, and only minor seasonal increases in incidence were reported.

Significant differences in the magnitude of the recruit epidemics of the various divisions were observed. The units assembled in the winter months in the northern states experienced severe epidemics of common respiratory disease. Units assembled in the southern states in the same season reported increases in incidence of much lower magnitude.

Divisions assembled during the summer months recorded minor increases in incidence during the first months of service. These units did not experience epidemics during the subsequent winter season. The addition of large numbers of recruits to some of these units in the following winter season produced moderate epidemics of common respiratory disease.

Divisions assembled without recruit epidemics did not experience epidemics when unfavorable geographic and seasonal circumstances were encountered as a result of movement of the units.

These observations suggest methods by which great losses of manpower during periods of mobilization for national defense can be reduced. Under favorable geographic and seasonal conditions large recruit populations may be assembled, trained, and become seasoned without epidemics of common respiratory disease.

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*First need in the reform of hospital management? That's easy! The death of all dietitians, and the resurrection of a French chef.*—Martin T. Fischer

# STEROID PREPARATIONS FOR TOPICAL THERAPY OF SKIN ERUPTIONS

HARRY M. ROBINSON, Jr., M. D.  
RAYMOND C. V. ROBINSON, M. D.  
JOHN F. STRAHAN, M. D.  
MORRIS M. COHEN, M. D.

**D**URING the past three years numerous steroid preparations have been developed for use in the topical therapy of skin eruptions. Previous reports have stressed the fact that local steroid therapy is of value only in the treatment of those conditions where its effectiveness has been demonstrated.<sup>1-5</sup> Atopic dermatitis, contact dermatitis, seborrheic dermatitis, pruritus ani, pruritus vulvae, and erythema solare are improved by the local application of certain steroid preparations; however, relapses of these eruptions are frequent when the applications are discontinued. These compounds have proved to be of no value in the local therapy of psoriasis, chronic discoid lupus erythematosus, alopecia areata, and many other conditions. At the present time hydrocortisone free alcohol, hydrocortisone acetate, fludrocortisone acetate, and combinations of these drugs with various antibiotics are commercially available in lotions, ointments, or creams for use by the practitioner.

Although the mode of action of topically applied steroids has not been determined, Sulzberger and Witten<sup>1</sup> postulated the theory that the beneficial effect may be due to the local hormonal action of the steroid on the skin. Livingood and associates<sup>9</sup> presented evidence that fludrocortisone acetate is absorbed from the unbroken skin and may produce undesirable side effects. Witten, Shapiro, and Silber<sup>10</sup> were unable to demonstrate systemic absorption from the local application of hydrocortisone acetate, and recently Smith and Rosenberg<sup>11</sup> supported the results of these investigations. In our experience<sup>3-5</sup> there has been little clinical evidence of absorption from the local application either of hydrocortisone and its esters or of fludrocortisone acetate, regardless of the vehicle used.

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From the University of Maryland School of Medicine, Baltimore, Md.

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The materials used in this study were supplied by Charles Pfizer & Co., Inc., Merck & Co., Inc., The Upjohn Co., Sharp and Dohme, Schering Corporation, and E. R. Squibb & Sons.

The development of new steroid compounds necessitates intensive clinical and laboratory investigation. This study has been conducted to determine the value of available steroid preparations for topical use, to assay those more recently developed, and to compare the action of the new compounds with those presently in use.

### METHOD OF INVESTIGATION

**Patient Selection.** This study was conducted on about 4,000 patients obtained from the outpatient departments of the University Hospital and the Baltimore City Hospitals as well as on hospitalized and ambulatory private patients. Many of the patients included in this report were also included in a previous study.<sup>1</sup> In a number of cases follow-up was incomplete, and these cases were dropped from the study. Age and sex did not influence the study and are not considered in the results and summary tables.

**Diagnoses and Evaluations.** Diagnoses were confirmed by clinical consultation and laboratory studies whenever indicated. Only objective changes in the dermatoses, *i. e.*, involution of lesions, were considered in tabulating results. In most instances, if a patient did not show some improvement after one week of therapy, the preparation was considered ineffective. Every patient was evaluated by a senior investigator, and all reported results were based on blind, controlled studies.

**Paired Comparison Studies.** This method of study was used primarily on hospitalized cases so that the applications and observations could be more carefully controlled. The preparations were furnished to the house officers with code number labels. The key to the code was kept by the secretary and was not revealed to either house officer or senior investigator until the study was complete. Placebo ointment was applied to one part of the body and active steroid ointment or lotion to another. In the same manner, the newer steroid ointments, creams, or lotions were compared with hydrocortisone or fludrocortisone preparations already on the market.

**Usage Studies.** Treatment was initiated with a steroid preparation of proven value, such as 1 per cent hydrocortisone or 0.1 per cent fludrocortisone ointment, cream, or lotion. After improvement was noted, either a placebo or one of the newer compounds, in the same base and in the same size and shape of container, was substituted without the patient's or physician's knowledge, to see if improvement would continue or relapse would occur. The subjective complaints of the patient, especially in regard to pruritus, and the objective examination of the examiner were carefully noted and recorded.

In an effort to determine the optimum concentration of steroid, treatment was initiated in one series with a weak concentration

(e. g., 0.5 per cent); if it proved to be ineffective, a stronger concentration was used (1.0 per cent); if this proved to be unsatisfactory, the concentration was gradually increased. In another series, treatment was initiated with a higher concentration (e. g., 2.5 per cent) and gradually reduced. The lowest concentration found to be effective was termed the Minimum Effective Concentration (MEC).

**Usual Treatment Method.** The ointment, cream, or lotion was supplied to the patient who was instructed to apply a thin coating over the involved area twice daily. For the duration of treatment with steroid preparations, all other local and systemic therapy was discontinued and the use of soap and other cleansing compounds was forbidden. In dermatoses complicated by secondary pyogenic infection where steroid-antibiotic topical therapy was the method of choice, patients were instructed to remove crusts and other surface debris with warm water or warm saline compresses prior to the application of the medication. The application was not massaged into the site.

**Vehicles Used.** The various steroids and steroid-antibiotic combinations were furnished in a variety of oily base ointments, greaseless base creams, and lotion bases. The following are the formulas used:

#### *Oily bases*

- No. 1 Liquid petrolatum  
Wool fat  
White petrolatum
- No. 2 Multiwax  
Cholesterol  
Liquid petrolatum  
White petrolatum
- No. 3 Liquid petrolatum  
Petrolatum
- No. 4 Butyl *p*-hydroxybenzoate  
Methylparaben  
Multiwax  
Cholesterol  
Mineral oil  
White petrolatum
- No. 5 Plasticized hydrocarbon-gel

#### *Greaseless bases*

- No. 1 Sodium lauryl sulfate  
Stearyl alcohol  
Cholesterol  
Liquid petrolatum  
Methylparaben  
Propylparaben  
Propylene glycol  
Cetyl alcohol  
Petrolatum  
Water
- No. 2 Zinc stearate  
Polyethylene glycol  
Propylene glycol  
Distilled water
- No. 3 Zinc stearate  
Propylene glycol  
Polyethylene glycol 1500  
Polyethylene glycol 4000

#### *Lotion bases*

- No. 1 Glycerin  
Isopropanol alcohol rubbing compound
- No. 3 Methylparaben  
Butyl *p*-hydroxybenzoate  
Propylene glycol



*Lotion bases—Continued**No. 1—Continued*

Sodium methylparahydroxy-  
benzoate  
Diglycol stearate  
Petrolatum  
Wax  
Distilled water

*No. 2 Diglycol stearate*

Cetyl alcohol  
Hydrous wool fat  
Petrolatum  
Olive Oil  
Tween 40  
Aseptoform  
Borax powder  
Sodium lauryl sulfate  
Glycerin  
Sulfatate B  
Oil lilac flower  
Menthol  
Alcohol  
Distilled water

*No. 3—Continued*

Polysorbate 80  
Tegacid regular  
Spermaceri  
Deionized water

*No. 4 Cetyl alcohol*

Stearyl alcohol  
Polysorbate 20  
Span 40  
Propylene glycol  
Parabens  
D C antifoam  
Distilled water

## STEROID COMPOUNDS

**1-Hydrocortisone and Hydrocortisone Esters (table 1).** This series of compounds was used in the treatment of 1,329 patients. Hydrocortisone free alcohol and hydrocortisone acetate were used in oily base ointments, greaseless base creams, and lotion bases. In all of these vehicles concentrations of 0.5 per cent, 1 per cent, and 2.5 per cent were used. Sixty-nine different preparations of these two steroids were used in the treatment of 1,096 patients. A relatively small series of patients were treated with all of the other hydrocortisone esters except hydrocortisone hemisuccinate sodium. A total of 148 patients with various dermatoses normally responsive to local hydrocortisone therapy were treated with hydrocortisone hemisuccinate sodium ointment.

**Fludrocortisone (table 2).** Only two compounds are included in this series. Fludrocortisone acetate in concentrations of 0.05 per cent, 0.1 per cent, and 0.25 per cent was incorporated in three oily bases and two lotion bases and applied to lesions in 1,067 patients who had dermatoses that normally will respond to local hydrocortisone therapy. 9- $\alpha$  fluorohydrocortisone tertiarybutylacetate in the concentration of 0.5 per cent in a lotion base was applied to lesions in 16 patients.

**Prednisone Derivatives (table 3).** Four preparations were included in this portion of the study. Prednisone in a lotion base

and in an oily base was used in the treatment of 50 patients. Prednisolone succinate in an oily base was used for 24 patients. Prednisolone No. 1 was used in lotion base, two oily bases, and one greaseless base in treating 68 patients, but the percentage of primary irritation from this compound was so high that further study was discontinued. Prednisolone No. 2 is a purified compound which was used in two oily bases and one greaseless base in the treatment of 60 patients.

**Allo Compounds (table 4).** The allo compounds are a group of synthetic steroids having complex chemical formulas. These compounds were used for clinical investigation in a limited number of patients. Use was restricted to the treatment of those dermatoses normally responsive to hydrocortisone or fludrocortisone.

**Steroid-Antibiotic Combinations (table 5).** In this portion of the study, combinations of one or more antibiotics with hydrocortisone acetate, hydrocortisone free alcohol, fludrocortisone acetate, and prednisolone have been used in the treatment of 1,753 patients. These preparations were dispensed in several oily base ointments and several lotion bases.

**Other Combinations of Steroids (table 6).** Combinations of hydrocortisone with Caligesic Lotion, Prantal Cream (brand of diphenmethanil methylsulfate) coal tar solution, crude coal tar, crude coal tar and Quinolor Compound Ointment, and pyridoxine hydrochloride have been used in the treatment of 226 patients.

## RESULTS

Topical steroid therapy has proved to be of definite value in the management of erythema solare, atopic dermatitis, dermatitis venenata, seborrheic dermatitis, intertrigo, pruritus ani, pruritus vulvae, lichen simplex chronicus, eczematous eruption of the hands, nummular eczema, stasis dermatitis, and eczematized epidermophytosis (table 7).

One portion of this study was devoted to selection of the most suitable vehicles for treatment of the various dermatoses. The results tabulated in table 7 are based on objective findings by the examiners and not on the patients' personal preference. Two patients treated with the base containing hydrous wool fat developed evidence of hypersensitivity to that ingredient. One preparation, not mentioned in the charts, contained 1 per cent hydrocortisone in a compressed air shaving cream container, but the base proved to be a severe primary irritant and after several patients developed adverse reactions, further study with this compound was discontinued. The vehicles used in the major portion of this study were found to be satisfactory.

TABLE 1. *Hydrocortisone free alcohol and hydrocortisone esters*

Steroid	Bases used	Total number of patients	Concentration of steroid (per cent)	MEC* (per cent)	Results	
					Good	Poor
Hydrocortisone free alcohol	Oily bases 1, 2, 3, 4, 5 Greaseless bases 1, 2, 3, 4 Lotion bases 1, 2, 3, 4	747	0.5, 1.0, 2.5 0.5, 1.0, 2.5 0.5, 1.0, 2.5	1.0	701	46
Hydrocortisone acetate	Oily bases 1, 2, 3, 4, 5 Greaseless bases 1, 2, 3 Lotion bases 1, 3	349	0.5, 1.0, 2.5 0.5, 1.0, 2.5 0.5, 1.0, 2.5	1.0	328	21
Hydrocortisone t-butylacetate	Oily base 3	37	0.5	0.5	18	19
Hydrocortisone pivalate	Oily base 3	23	0.05, 1.0	1.0	20	3
Hydrocortisone hemisuccinate sodium	Oily base 3	198	0.25, 0.5	0.5	186	12
Hydrocortisone diethylaminoacetate	Oily base 3	19	0.5	0.5	16	3
14-hydroxyhydrocortisone	Oily base 3	16	1.0	1.0	7	9

\*Minimum effective concentration



Hydrocortisone free alcohol and hydrocortisone acetate (table 1) in oily base, greaseless base, or lotion base was found to be equally effective in the treatment of responsive dermatoses (table 7). The optimum concentration in the vehicles used is 1.0 per cent. Relief of pruritus and involution of the eruption is only temporary, however, and when the applications are discontinued relapses will occur in the majority of cases. Relief of symptoms may be maintained by continued local therapy with these drugs, gradually reducing the frequency of the applications to once daily, and in some cases once every other day.

Six additional esters of hydrocortisone were studied, and of these, hydrocortisone hemisuccinate sodium and hydrocortisone diethylaminoacetate hydrochloride were effective. The MEC of those two compounds in an oily base was 0.5 per cent. By paired comparison studies and usage tests, each of these esters is as efficient as hydrocortisone or hydrocortisone acetate in a similar vehicle.

Fludrocortisone (table 2) was used in the treatment of 1,067 patients with responsive dermatoses and had an MEC of 0.1 per cent. The comparative studies between fludrocortisone and hydrocortisone indicated that the difference between the two compounds was quantitative and not qualitative. A new derivative, 9- $\alpha$ -fluorohydrocortisone tertiary-butylacetate, had an MEC of 0.5 per cent; however, the relatively low efficiency of this preparation indicated it to be of little value in dermatologic therapy.

Studies on the local efficacy of the delta-1 steroids (table 3) included observations on lotions, greaseless base creams, and oily base ointments containing prednisolone No. 1, prednisolone No. 2, and prednisolone succinate. Prednisone proved to be of little value in the treatment of normally responsive dermatoses, and in many instances (31 per cent) was productive of primary irritation on local application. The initial studies with prednisolone (prednisolone No. 1) indicated that this steroid was of value in the treatment of normally responsive dermatoses, but 25 per cent of the patients treated with this ointment developed evidence of primary irritation. Because of such reactions further studies with these compounds were discontinued. A purified compound, prednisolone No. 2, was developed for clinical investigation, and this compound was found to be efficient with an MEC of 0.5 per cent. By paired comparison and usage tests 0.5 per cent prednisolone No. 2 is as efficient as 1.0 per cent hydrocortisone or 0.1 per cent fludrocortisone. Prednisolone succinate was effective in a concentration of 0.5 per cent.

In the search for new and more effective steroid compounds for local therapy, a group of compounds with complex chemical

TABLE 3. *Prednisone derivatives*

Steroid	Bases used	Total number of patients	Concentration of steroid (per cent)	Results	
				Good	Poor
Prednisolone No. 1	Lotion base 1 Oily bases 3, 4 Greaseless base 3	68	0.5	40	28
Prednisolone No. 2	Oily bases 3, 4 Greaseless base 3	60	0.5	55	5
Prednisolone	Lotion base 1 Oily base 3	50	0.5	23	27
Prednisolone succinate	Oily base 3	24	0.5	16	8

formulas called "allo compounds" (table 4) have been developed for clinical investigation. One of these, 9- $\alpha$  fluoro-allodihydrocortisone acetate, was found to be the most effective and the least irritating. 9- $\alpha$  fluoro-allodihydrocortisone tertiary-butylacetate was effective but produced a high incidence of primary irritation. No reactions of specific hypersensitivity have been produced by the members of this series which have been studied. More definite conclusions relative to the ultimate efficacy of these compounds cannot be formed on such a small series of patients. At the present time the results indicate that the members of the allo series that have been studied will be of little value for topical therapy because of the high incidence of primary irritation.

Antibiotic-steroid combinations (table 5) were valuable in the treatment of responsive dermatoses complicated by secondary pyogenic infection. The fact that the antibiotic does not inhibit the action of the steroid was demonstrated by using the various preparations on normally responsive dermatoses which were not secondarily infected. The fact that the steroid does not inhibit the action of the antibiotic was demonstrated by the prompt response of pyogenic infection to the applications. There was a low incidence of adverse reactions to any of these preparations. Gratifying results were obtained in the treatment of secondarily infected contact dermatitis of the hands of housewives.

Six different combinations of hydrocortisone and fludrocortisone with coal tar, Prantal Cream, Caligesic Lotion, and pyridoxine hydrochloride were available for study (table 6). A combination of hydrocortisone and Caligesic in a lotion base was not effective in the treatment of normally responsive dermatoses because of the high incidence of primary irritation. A combination of hydrocortisone with Prantal in a cream base proved to be par-

TABLE 4. *Allo compounds*

Steroid	Bases used	Total number of patients	Concentration of steroid (per cent)	MEC (per cent)	Results	
					Good	Poor
Allohydrohydrocortisone acetate	Lotion base 1	13	0.5 and 1.0	0.5	8	5
9-alpha-fluoro-allohydrohydrocortisone acetate	Lotion base 1	31	0.5 and 1.0	0.5	22	9
9-alpha-fluoro-allohydrohydrocortisone tertiary-butyrate	Lotion base 1	16	0.5 and 1.0	0.5	5	11
Allohydrohydrocortisone tertiary-butyrate	Lotion base 1	12	0.5 and 1.0	0.5	8	4

TABLE 5. Antibiotic-steroid combinations

Steroid	Antibiotic	Bases	Total number of patients	Concentration of steroid (per cent)	Results		MEC (per cent)
					Good	Poor	
Hydrocortisone free alcohol and hydrocortisone acetate	Oxytetracycline	Oily base 3	575	1.0	526	49	1.0
	Erythromycin	Oily base 3	38	1.0	33	5	1.0
	Tetracycline hydrochloride	Oily base 3	200	1.0	182	18	1.0
	Chlortetracycline hydrochloride	Oily base 3	6	1.0	5	1	1.0
	Neomycin	Oily bases 3, 4 Lotion base 3	215	1.0	200	15	1.0
	Neomycin-bacitracin	Oily bases 3, 4 Lotion base 3	70	1.0	62	8	1.0
	Neomycin-bacitracin-polymyxin B sulfate	Oily base 4	62	1.0	54	8	1.0
	Oxamycin	Oily base 3	50	1.0	45	5	1.0
	Oxamycin-MK63	Oily base 3	39	1.0	34	5	1.0



TABLE 5. Antibiotic-steroid combinations—Continued

Steroid	Antibiotic	Bases	Total number of patients	Concentration of steroid (per cent)	Results		MEC (per cent)
					Good	Poor	
Fludrocortisone acetate	Neomycin	Oily base 4 Lotion base 1	67	0.1 and 0.25	61	6	0.1
	Neomycin-tyrothricin	Oily base 3 Lotion base 1	32	0.1 and 0.25	30	2	0.1
	Neomycin-bacitracin	Oily base 3 Lotion base 1	71	0.1 and 0.25	66	5	0.1
	Neomycin-gramicidin	Oily base 5 Lotion base 4	250	0.1	222	28	0.1
	Nystatin	Oily base 5	20	0.1	18	2	0.1
Prednisolone	Neomycin-bacitracin	Lotion base 1 Oily base 3	28	0.5	16	12	0.5
	Neomycin	Lotion base 1 Oily bases 3, 4	30	0.5	21	9	0.5

ticularly effective in the treatment of intertrigo. In the treatment of chronic lichenoid dermatitis, combinations of hydrocortisone with coal tar solution and fludrocortisone with crude coal tar and Quinolor Compound Ointment were effective in producing relief of symptoms. A combination of hydrocortisone with pyridoxine was used in the treatment of seborrheic dermatitis, but comparative studies and usage tests indicate that this preparation is not superior to hydrocortisone ointment or lotion. It is evident that the addition of pyridoxine hydrochloride to a preparation containing a steroid does not add to the efficacy of the steroid ointment.

TABLE 6. *Other steroid combinations*

Steroid		Total number of patients	Concentration of steroid (per cent)	Results	
				Good	Poor
Hydrocortisone	Caligesic Lotion	22	0.5	13	9
Hydrocortisone	Prantal Cream	68	.25	60	8
Hydrocortisone	Coal tar solution	22	1.0	18	4
Hydrocortisone	Crude coal tar	10	1.0	6	4
Fludrocortisone	Crude coal tar and Quinolor Compound Ointment	60	0.1	53	7
Hydrocortisone	Pyridoxine hydrochloride	44	1.0	31	13

In the course of this investigation, topical steroid therapy proved to be of *no* value in the treatment of:

Psoriasis	Alopecia areata
Lichen planus	Epitheliomata
Chronic discoid lupus erythematosus	Acne vulgaris
Morphea	Cutaneous fungus infections
Keratosis follicularis	Pustular bacterid
Pityriasis rosea	Herpes simplex
	Verrucae

## COMMENT

The local preparations of hydrocortisone free alcohol, hydrocortisone acetate, fludrocortisone acetate, steroid-antibiotic combinations, and some of the other combinations of hydrocortisone were found to be valuable additions to the armamentarium of the physician provided that he takes into consideration the fact that these preparations seldom produce more than temporary relief from symptoms. In many instances, the necessity for systemic steroid therapy has been obviated by the proper use of the topical preparations. It has been possible to discontinue systemic ad-

TABLE 7. *Dermatoses definitely benefited by topical steroid therapy*

Dermatoses	Number of patients		Most satisfactory vehicle
	Improved	Unimproved	
Erythema solare	60	0	Lotion, greaseless base cream
Atopic dermatitis	735	95	Lotion, oily base, greaseless base cream
Atopic dermatitis (complicated by pyogenic infection)	300	30	Antibiotic-steroid preparation in lotion or oily base
Dermatitis venenata (all causes)	450	70	Lotion, greaseless base cream
Dermatitis venenata (complicated by pyogenic infection)	301	20	Antibiotic-steroid preparation in lotion or oily base
Seborrheic dermatitis	128	23	Oily base, or greaseless base
Seborrheic dermatitis (complicated by pyogenic infection)	92	9	Antibiotic-steroid preparation in lotion or oily base
Intertrigo	91	4	Lotion, greaseless base
Pruritus ani	242	31	Oily base, lotion
Pruritus vulvae	135	22	Oily base, lotion
Lichen simplex chronicus (neurodermatitis)	175	32	Oily base, greaseless base
Eczematous eruption of hands	350	41	Oily base, antibiotic-steroid combination in oily base
Nummular eczema	37	3	Oily base
Status dermatitis	123	23	Oily base, greaseless base
Eczematized epidermophytosis	22	4	Oily base

ministration of steroids in some individuals by the use of the ointments, creams, or lotions containing hydrocortisone, hydrocortisone acetate, and fludrocortisone. Dramatic relief has been afforded many patients with pruritus ani, pruritus vulvae, localized neurodermatitis, atopic dermatitis, and contact dermatitis.

### CONCLUSIONS

Hydrocortisone free alcohol and hydrocortisone acetate are effective in the treatment of responsive dermatoses when applied locally in concentrations of 1 per cent or greater and in suitable vehicles. Hydrocortisone hemisuccinate sodium and hydrocortisone diethylaminoacetate hydrochloride in concentrations of 0.5 per cent are both effective in the treatment of responsive dermatoses. By paired comparison studies and usage tests, a concentration of 0.5 per cent of these two compounds is as effective as 1 per cent hydrocortisone free alcohol or hydrocortisone acetate.

Fludrocortisone is effective in the treatment of responsive dermatoses when applied locally in concentrations of 0.1 per cent or greater and in suitable vehicles. The difference in action between hydrocortisone, hydrocortisone esters, and fludrocortisone is quantitative, not qualitative.

Prednisone is relatively ineffective on topical application. Initial studies on prednisolone indicated this compound to be therapeutically effective but productive of primary irritation in 25 per cent of the patients treated. Recent studies with purified prednisolone indicate that this steroid is consistently beneficial in the treatment of responsive dermatoses without the production of primary irritation.

The allo compounds included in this study have proved to be of little value because of the high incidence of primary irritation produced by the topical applications. The addition of antibiotics to ointments, creams, or lotions containing topically active steroids does not alter the effect of the steroid and has the additional therapeutic advantage of eradicating any secondary pyogenic infection that may be present. These steroid-antibiotic combinations proved to be of value in the treatment of responsive dermatoses complicated by secondary pyogenic infection.

Combinations of hydrocortisone with Caligesic Lotion proved to be of little value because of primary irritation produced. Hydrocortisone added to Prantal Cream was of value in the treatment of uncomplicated intertrigo. Combinations of fludrocortisone and hydrocortisone with coal tar are valuable in the treatment of lichenified dermatitis.

Topical steroid therapy proved to be of no value in the following conditions: psoriasis, lichen planus, chronic discoid lupus

erythematous, morphea, keratosis follicularis, pityriasis rosea, alopecia areata, epitheliomata, acne vulgaris, cutaneous fungus infections, pustular bacterid, herpes simplex, and verrucae.

In self-limited inflammatory conditions, the topical application of the steroid offers immediate relief to the patient and may prevent such a dermatosis from becoming chronic. In responsive chronic dermatoses, topical steroid therapy may offer a maximum relief to the patient, but in these eruptions it does not produce permanent involution of lesions. In many instances, topical steroid therapy may obviate the necessity for systemic steroid therapy.

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"Within 25 years there will be, in the adult population, three special persons for every able-bodied worker. There will be: one physically handicapped, one chronically ill, one over 65 years old.

"Nutrition can help every one of these groups to better and more useful lives."

—L. B. PETT, M. D.  
in *Canadian Services Medical Journal*, p. 200, Mar. 1956

# RECENT PROGRESS IN EXPERIMENTAL ELECTROCARDIOGRAPHY

J. A. ABILDSKOV, *Captain, MC, USAR*

**D**URING the past several years the technics employed in clinical electrocardiography have undergone relatively little change. The 1943 recommendations of the American Heart Association's committees on standardization of electrocardiographic nomenclature and precordial leads have been widely adopted, and both the range of usefulness and the limitations of the electrocardiogram as currently used have been well defined. In contrast to the static state of clinical electrocardiography, important experimental observations have been made during this period. Because the new information obtained will undoubtedly influence clinical use of the electrocardiogram, it seems desirable to summarize and view in perspective certain of the recent studies.

## HISTORICAL PERSPECTIVE

Although many workers have made significant contributions to electrocardiography, two are especially noteworthy both for the merit of their work and for their influence on the approach taken by others in this field. The early history of electrocardiography is dominated by the work of Sir Thomas Lewis. In a surprisingly short time use was made of his observations to form an important part of the clinical evaluation of patients. The electrocardiographic characteristics of the major arrhythmias were identified by Lewis, making possible the important therapeutic and prognostic implications of precisely identified mechanisimal disturbances. Dr. Frank N. Wilson played a similar role in the later history of electrocardiography. His contributions may be summarized as the application of mathematics and basic principles of physics to the study of the electrocardiogram, and resulted in bringing order to a field which would otherwise consist of a bewildering collection of empiric observations. Wilson's work has also had the important effect of encouraging further work in which mathematics and the fundamental principles of physics and other disciplines are employed. This approach, together with improving instrumentation and experimental technics, has resulted in significant progress in several areas related to electrocardiography.

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From William Beaumont Army Hospital, Fort Bliss, Tex.

## ORIGIN OF BIOELECTRIC PHENOMENA

Considerable clinical usefulness of the electrocardiogram was achieved in spite of only meager knowledge of the processes which give rise to electric phenomena in the heart. It seems certain that identification of these processes will result in an even greater range of usefulness. The origin of bioelectric potentials is by no means completely understood at this time, but radioactive isotope technics and modern physical and enzyme chemistry have provided important information in this area. Studies of nerve tissue employing radioactive isotopes have demonstrated a movement of sodium ions into the interior of cells during the rising phase of action potentials and a movement of potassium out of the cell during the falling phase.<sup>1</sup> These ionic movements must be set in motion by chemical processes, and there is evidence that acetylcholine is the agent responsible for altered ion permeability.<sup>2</sup> A working concept of the origin of bioelectric potentials is that acetylcholine exists in a bound inactive form in the resting state. Excitation of the cell by any means results in a release of acetylcholine which acts on a specific receptor and results in permeability changes which are followed by the ionic movements described. The acetylcholine is rapidly inactivated by the enzyme acetylcholinesterase.

## SEQUENCE OF ELECTRICAL EVENTS IN THE HEART

The structure of clinical electrocardiography has been built on limited knowledge of the sequence in which electrical events involve various portions of the heart. The general path of activation in the atria was relatively easily defined because these structures are thin and for most purposes the spread of electrical events through them may be considered as a surface phenomenon. In the ventricles, however, the sequence of activation on the surface cannot be presumed to indicate the same as that in the underlying muscle. Several recent studies have provided important information on the detailed sequence of activation throughout the thickness of the ventricles.

Scher and Durrer and their co-workers<sup>3-5</sup> used similar technics in investigations of the order of ventricular activation in dogs and other animals. Both used multiple small electrodes on needles inserted in the ventricular muscle at a variety of sites and recorded electrical events with cathode-ray oscilloscopes, employing technics which permitted time relations in the range of milliseconds to be recognized. Both investigators confirmed earlier studies indicating that the general sequence of activation of the left ventricular wall proceeds from apical toward basal regions. Scher's studies, which included study of the intraventricular septum, also confirmed the finding that the left side of the septum was the earliest portion of the ventricular muscle to





points on a line through the source. The degree to which canceling mirror patterns of electrocardiographic leads could be found on the surface of the body of both normal and abnormal subjects was studied. Their results indicated that approximately 90 per cent of the electrical potential appearing at any point on the body may be ascribed to a dipole-like source at the heart. Similar studies by Frank<sup>12</sup> indicated that the QRS complex at all points on the body of normal subjects can be considered to arise from a dipole source with an average accuracy of 5 per cent. Detailed studies of a single subject by Frank<sup>13</sup> also support the validity of the dipole concept. In these studies, potentials at the surface of a model of the subject's torso produced by an actual dipole source were compared with QRS complexes recorded from the subject. Both amplitude and wave form were found to correspond to an accuracy of  $\pm 15$  per cent.

These studies have the important connotation of questioning the validity of the "semidirect" lead concept. The results tend to indicate that most of the information which can be obtained from the surface of the body concerning electrical events in the heart is present in leads recorded from distant or remote electrode sites. This is especially important when considered in association with the advances in recording methods. It would mean that a vectorcardiogram recorded from electrode sites yielding horizontal, vertical, and anteroposterior components of electrical activity in the heart would contain not only most of the information available in the limb and precordial leads in current use but most of the information about electrical activity in the heart that it is possible to obtain from electrodes anywhere on the surface of the body. A great deal of clinical experience will of course be necessary to confirm this thesis on a practical level and to define the form in which the clinically important information presents itself.

The limb leads currently employed in clinical electrocardiography reflect the heart's electrical activity in only one plane. To some extent the precordial leads reflect electrical activity in other planes but it is still difficult to visualize this activity as it occurs in space. The vectorcardiogram permits such a view of electrical activity, and increasing interest in records of this type has focused attention on methods of electrode placement which will permit the least distorted view of this activity. Many systems of electrode placement have been suggested. Most of these are simple geometric arrangements such as the tetrahedron, parallelepiped, or cube. Frank's<sup>14</sup> studies have indicated that among these electrode arrangements, the equilateral tetrahedron yields the most valid indication of the heart's electrical activity. All of these electrode systems, however, are known to result in significant errors, and it is highly desirable that more adequate

systems be devised. One approach to this problem is represented by the work of McFee and Johnston.<sup>21-23</sup> These workers employed plaster models of selected planes of the body, through which water was made to flow in sheets. The models were so arranged that resistance to the flow of fluid in them was analogous to electrical resistance in the body and the flow lines of the water were made visible by small crystals of a soluble dye. With these fluid mappers the pattern of flow lines between various electrode combinations could be visualized and it was possible to select combinations of electrodes in which the undesirable features of the flow lines tended to cancel one another. From these studies electrode combinations to yield horizontal and anteroposterior components of the heart's electrical activity were suggested. Electrodes on the right and left arms are paired with electrodes on the right and left sides of the thorax to yield the horizontal component, and multiple electrodes in the front and back of the chest are employed to obtain the anteroposterior component.

Extensive studies by Frank<sup>24</sup> and by Schmitt and Simonson<sup>25</sup> employing torso models have resulted in other suggested methods of electrode placement. At the present time it seems that additional experimental work is still necessary to define the optimum electrode combinations, and from the progress to date this should soon be achieved. Application of this improved electrode system of the future is certain to provide more accurate electrocardiograms and vectorcardiograms and is very likely to improve the clinical usefulness of these records.

#### PRESENTATION OF ELECTROCARDIOGRAPHIC INFORMATION

The conventional electrocardiogram is a Cartesian co-ordinate graph in which voltage is plotted against time. The quantities represented are scalars, having the properties of magnitude and sign. Many methods employed in interpretation of electrocardiograms, such as the estimation of mean electrical axis, are examples of vector analysis. In the application of such methods to the electrocardiogram, vector quantities which have the property of specific direction as well as that of magnitude are derived from the scalars. It has been obvious for many years that actual recording of electrical events from the heart as vectors might have certain advantages over recording scalar quantities. Electronic amplifiers and cathode-ray oscilloscopes have made it possible to obtain such records, and during the past few years they have been subjected to extensive study. Even though these studies have been handicapped by the inadequacies of the electrode systems employed, there are many indications that vectorcardiograms will eventually furnish clinically important information in addition to that provided by the conventional electrocardiogram.

Despite certain potential advantages, the vectorcardiogram recorded from cathode-ray oscilloscopes has a major disadvantage in the difficulty of representing time in such a record. It seems possible to retain the advantages of a vector presentation and yet have time adequately represented by presenting magnitude and orientation of spatial vector forces as separate traces on a Cartesian co-ordinate graph. Such a method of presentation was suggested by McFee,<sup>16</sup> who reported construction of a computer allowing registration of such traces from one plane of the body. More recently Sayers, Silberberg, and Durie<sup>17</sup> reported observations on curves of spatial magnitude only. Other observations on curves of both spatial magnitude and orientation have indicated that the information known to be clinically important in the electrocardiogram and the vectorcardiogram is present in easily accessible form in such records.<sup>18</sup> These observations have also indicated that certain variations in spatial magnitude of recorded electrical events from the heart are made apparent by this method of presentation even when they are not easily evident in the electrocardiogram or vectorcardiogram recorded from cathode-ray oscilloscope. Study of these tracings in which vectorcardiographic data is presented on a linear time scale is just beginning, but it offers considerable promise for more precise study of electrical phenomena arising from the heart than has been possible previously.

Considerable progress has been made in obtaining a quantitative expression of the relation between activation and recovery, and this relation is the basis of the concept of the ventricular gradient. Electronic devices for the automatic determination of this quantity have been devised.<sup>19-21</sup> Assessment of the final value of this quantity in clinical practice will require extensive correlation with other clinical, laboratory, and pathologic data.

### SUMMARY

While clinical electrocardiography has changed very little for several years, there has been considerable progress in this field on the experimental level. This progress has ranged from new information concerning the cellular processes which give rise to electric potential, to improvements in the methods of recording, and manner of presenting records of electrical activity in the heart. There have also been refined and detailed studies of the sequence of spread of electrical processes through the heart and important advances in methods of electrode placement to extract the most valid information about these processes from the surface of the body. Progress in all of these areas is pertinent to clinical electrocardiography and seems certain to extend the range and accuracy of this method of diagnosis.

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## SURGERY AND THE CORONARY

"It now appears that, if a patient has survived his acute coronary heart episode and has made the transition into the chronic stage, his outlook for a long and productive life is good enough to warrant almost any operation that would otherwise be justifiable. It also appears that under such circumstances the risk of surgery is negligible insofar as cardiac deaths are concerned. This reassuring fact should make patients with coronary heart disease much less reluctant to submit to recommended surgery and much less frightened when they do."

—BENJAMIN ETSTEN, M. D., and

SAMUEL PROGER, M. D.

in *Journal of American Medical Association*

p. 848, Oct. 29, 1955

# CONGENITAL ATRESIA OF THE ESOPHAGUS WITH TRACHEOESOPHAGEAL FISTULA

PAUL A. THOMAS, *Captain, MC, USA*  
ROSCOE E. MASON, *Major, MC, USA*  
GEORGE L. BEATTY, *Colonel, MC, USA*

**T**HE NECESSITY for prompt surgical correction of congenital atresia of the esophagus with tracheoesophageal fistula is widely recognized. The diagnostic criteria of excessive salivation, regurgitation, with or without cyanosis, and the demonstration of a blind esophageal pouch by catheter and fluoroscopic study have been well documented. The surgical procedures for the correction of this anomaly have been standardized. We here record the experience at this hospital to emphasize more fully some of the practical problems which arise in the management of these infants.

This anomaly was described by Gibson in 1703.<sup>1,2</sup> It was not until 1939 that surgical treatment was successfully accomplished. This was done by closure of the fistula and exteriorization of the proximal esophageal pouch by Leven<sup>3</sup> and by Ladd.<sup>4</sup> Haight and Towsley<sup>5</sup> performed the first successful primary esophageal anastomosis for this condition which was reported in 1943. Since that time the advances in surgery of the newborn infant have enabled many of the large centers to report from 60 to 80 per cent survival after operation.

Any discussion of this subject would be incomplete without reference to classification as indicated graphically (fig. 1) as adapted from Ladd<sup>3,4</sup> and Vogt.<sup>6</sup> Congenital anomalies are more common among premature infants, and in many instances, are multiple. The incidence of tracheoesophageal fistula is variously recorded as between 1 in 800 and 1 in 2,500 births. At this hospital there have been five cases over a three-year period, extending from February 1952 to February 1955. During this time there were a total of 9,320 births, including 106 stillbirths. This is an incidence of 1 case of esophageal atresia with tracheoesophageal fistula per 1,864 births. This anomaly occurred in one premature stillbirth and was discovered at autopsy. The remaining four cases were in full-term infants in whom the diagnosis was made and an operation performed. In three instances the fistula entered

esophageal atresia with tracheoesophageal fistula was suspected and was confirmed by lipiodol esophagram (fig. 3). The chest roentgenogram at this time revealed atelectasis of the right upper lobe. After cannulation of a vein the infant was taken to the operating room. Under endotracheal anesthesia a transpleural approach through the bed of the resected fifth rib was made. The fistula was identified at the carina and closed. A satisfactory two-layer anastomosis of the esophagus with minimal tension was accomplished. On two occasions during the procedure cardiac massage was required to reinforce the feeble contractions. A nasogastric tube and intercostal catheter were left in place. A gastrostomy was performed. The patient was maintained on intravenous fluid therapy for 72 hours, at which time gastrostomy feeding was instituted and the nasogastric tube removed. The feedings were gradually increased in amount. On the ninth postoperative day oral feedings were begun and shortly thereafter the gastrostomy tube was removed. Fifteen days postoperatively a lipiodol esophagram appeared normal (fig. 4). Penicillin and streptomycin sulfate were administered postoperatively. A month after surgical intervention the infant was discharged from the hospital and subsequently lost from follow-up when the parents were transferred from this community.

*Comment.* In this instance, in spite of known preoperative atelectasis and a precarious situation at operation requiring cardiac massage, a good anastomosis with minimal tension was

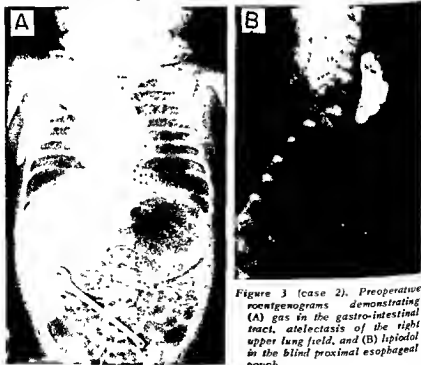


Figure 3 (case 2). Preoperative roentgenograms demonstrating (A) gas in the gastro-intestinal tract, atelectasis of the right upper lung field, and (B) lipiodol in the blind proximal esophageal pouch.

obtained. Gastrostomy feedings were administered early in the postoperative period without danger to the esophageal repair and the baby survived.

**Case 3.** This 6 lb 15 oz baby girl was born on 6 October 1953. The pregnancy and delivery were uncomplicated. Within eight hours the infant was noted by the nursery staff to be producing an abnormal amount of mucus. At this time several episodes of cyanosis occurred. An attempt to pass a gavage tube was unsuccessful, and a diagnosis of esophageal atresia with tracheoesophageal fistula was confirmed by lipiodol esophagram (fig. 5). The patient was operated on within the first 24 hours of life. A vein was cannulated and endotracheal anesthesia administered. A transpleural approach through the bed of the resected fourth rib was performed. The fistulous tract was identified entering the carina; this was divided, and the trachea repaired. During the dissection of the blind proximal pouch of esophagus from the trachea, the latter was inadvertently opened a distance of 1 cm in the posterior membranous portion. This opening was immediately repaired. An end-to-end, two-layer anastomosis of the esophagus over a catheter was obtained. There was moderate tension of the suture line. The naso-

gastric tube was left in place and an intercostal catheter inserted during closure of the chest. Postoperatively the baby was cyanotic when out of the oxygen tent and appeared more irritable than expected. A roentgenogram of the chest at this time revealed haziness of the left upper lung field. Twenty-four hours postoperatively the infant began having irregular, grunting respiration. Respiration gradually became rapid and irregular over the next several days, and the baby died of respiratory insufficiency on the third postoperative day. Autopsy permission was not obtained.

*Comment.* This case points out the seriousness of pulmonary complications. These should be considered as a part of the pathologic condition in



Figure 4 (case 2). Postoperative lipiodol esophagram demonstrating an intact esophagus.



all of these infants. This was a difficult operative procedure during which the trachea was opened. The addition of a tracheotomy might have provided a better chance for survival.



*Figure 5 (case 3). Preoperative roentgenogram revealing the presence of gastro-intestinal gas, as well as the proximal esophageal pouch outlined with lipiodol.*

**Case 4.** This 6 lb 2 oz baby boy was born on 27 January 1955. The pregnancy and delivery were uncomplicated. The infant was allowed to remain at the mother's bedside in a bassinet, in keeping with the "rooming-in" policy of the obstetrical service. The baby was, therefore, cared for by the mother who was not aware of the significance of persistent regurgitation. When the infant was two days of age the nursery staff became aware of the situation when an episode of cyanosis was observed. The diagnosis of esophageal atresia with tracheoesophageal fistula was confirmed on the third day of life by lipiodol esophagram (fig. 6). A vein was cannulated and endotracheal anesthesia administered. The thoracic cavity was entered through the bed of the resected fourth rib. The distal esophagus was identified and the fistulous tract found entering 1.5 cm above the carina in the posterior mem-

braneous portion of the trachea. The fistula was closed by suture and a two-layer esophageal anastomosis with minimal tension accomplished. A gastrostomy and tracheotomy were performed at the conclusion of the procedure. A nasogastric catheter was left in place as well as an intercostal tube. The nasogastric catheter, intercostal tube, and tracheotomy tube were removed 24 hours postoperatively. The infant was maintained on fluids given intravenously for 48 hours. Penicillin and streptomycin sulfate were administered. On the third postoperative day gastrostomy drip feeding of glucose water was begun. The amount and strength of feeding was gradually increased until several ounces of formula for newborn infants were given every three hours. On the sixth postoperative day, oral feedings in small amounts were started. The patient continued to do well throughout the remainder of hospitalization. A follow-up esophagram revealed good function (fig. 7), and the baby was discharged from the hospital. At the age of six weeks the infant was seen in the outpatient clinic and was doing well.

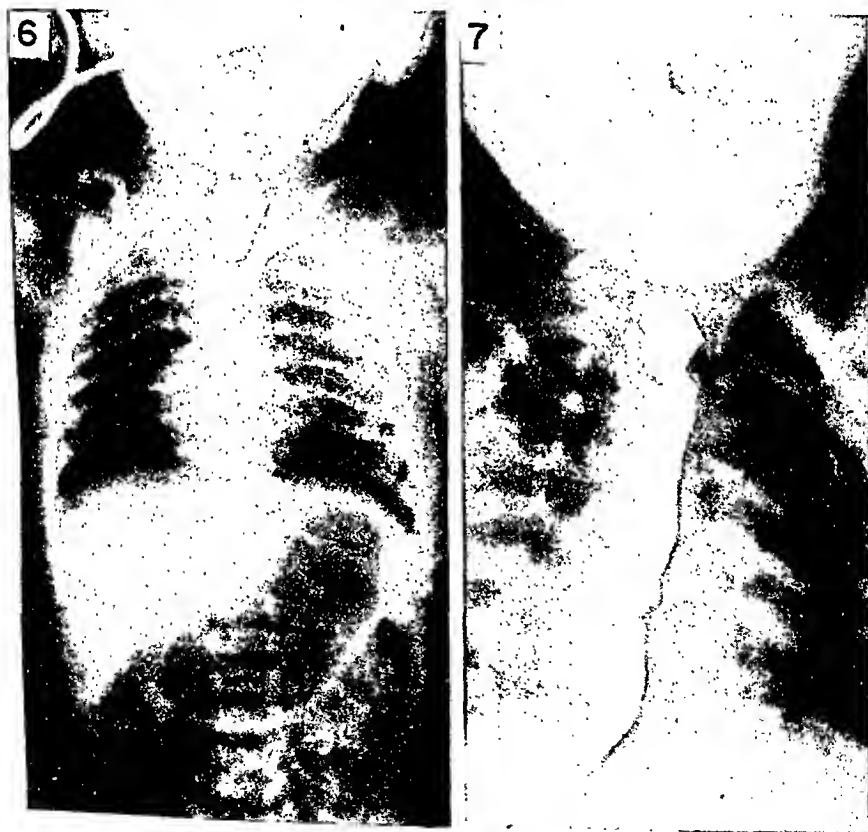


Figure 6 (case 4). Preoperative roentgenogram with lipiodol in the proximal esophageal pouch. Note the gas in the stomach and intestines. Figure 7 (case 4). Postoperative lipiodol esophagram. The arrow points to the site of anastomosis.

*Comment.* The location of the fistula high in the trachea above the carina was fortunate in that a good anastomosis with minimal tension was possible. Early postoperative pulmonary complications were anticipated and prevented by tracheotomy which was added to the operative procedure. The value of tracheotomy in this instance may be questioned; however, it did not increase the operative procedure appreciably and certainly did not increase the risk.

### DISCUSSION

The diagnosis and surgical treatment of esophageal atresia with tracheoesophageal fistula have been adequately described in the literature.<sup>1-3, 7-11</sup> The postoperative management of these infants assumes equal importance if one is to obtain consistently satisfactory results. The administration of fluids and blood through a vein requires a preoperative "cut down" in the newborn infant. This provides for continuous administration of fluid during the critical 48- to 72-hour postoperative period. However, meticulous and constant observation of the flow rate must be maintained to prevent pulmonary edema. We accomplish this by making a detailed chart of the rate of flow in milliliters of fluid per hour to be administered, based on the 24-hour requirement. A blank column is provided on the chart which is filled in at hourly intervals by the nursing staff recording the actual volume of fluid given. Fluids are administered from a modified 200-cc graduated buret so that an accurate record can be maintained and the danger of overhydration minimized. An intercostal catheter must be left in the thorax and attached to a water-seal drainage bottle for at least 24 hours or longer to ensure expansion of the lung and a dry pleural cavity. Precautions commonly utilized in thoracic surgery, namely, endotracheal anesthesia and antibiotic therapy, have permitted the more satisfactory transpleural approach. It is tempting to rely on the nasogastric catheter placed at operation to prevent regurgitation of gastric secretions to the site of anastomosis in the immediate postoperative period, and to institute tube feeding within 48 to 72 hours. In our limited experience it would seem that a gastrostomy is more satisfactory. Certainly, for those who are only occasionally called on to perform such an operation, a gastrostomy is indicated. Continuous drip feeding may be administered by this route within 24 to 48 hours after the operation.

The dehiscence of the esophageal anastomosis in the first baby treated resulted in fatality. A gastrostomy performed as a part of the initial operation would have provided a satisfactory feeding route which was not otherwise available. Disruption of the anastomosis must be anticipated and recognized as a possible complication. Mediastinal drainage in the first case at the time of disruption would have improved the possibility of survival. It must be assumed that all of these infants have aspira-

tion pneumonia and atelectasis. The importance of obtaining and maintaining expansion of the lungs cannot be overemphasized. It must also be assumed that the older the baby is before diagnosis, the more serious the pulmonary complications are likely to be. For this reason we believe that tracheotomy should be considered in those patients in whom the diagnosis or surgical intervention is delayed. This concept is not presented in the surgical literature as a part of the treatment for congenital esophageal atresia with tracheoesophageal fistula. We believe that this is of value in selected patients as it provides adequate access to the tracheobronchial tree for aspiration and improves pulmonary function by decreasing the dead space volume. The provision of a warm, moist atmosphere with a high oxygen content is an important adjunct in management during the critical immediate postoperative period. Antibiotic therapy has certainly been of value in minimizing secondary infection, but will not substitute for good surgical technic.

### SUMMARY

We have presented our brief experience with four cases of surgically treated infants having esophageal atresia with tracheoesophageal fistula. There were two fatalities. It has been pointed out that the limiting factor in the operative decision to perform esophageal anastomosis is the amount of tension on the suture line. The first fatality resulted from the disruption of the anastomosis. The addition of a gastrostomy to the operative procedure allows safe early feeding. Emphasis has been placed on the postoperative management of these patients. All of these infants must be treated for aspiration pneumonia. Tracheotomy in those babies in whom the diagnosis or treatment has been delayed may be indicated.

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### INFANT FEEDING

"There is another tendency in modern infant feeding which needs to be brought under critical scrutiny. This is the practice of beginning solid food supplements at increasingly early ages. Early in the 1920's, solid food additions were made rather cautiously during the latter months of the first year. Marriott, in the second edition of his excellent book on infant nutrition published in 1935, states that the appropriate age to begin solid food additions is six months. Today, many infants are having their milk diets supplemented by solid foods as early as the second and third week of life and many more, perhaps a majority, by the beginning or middle of the second month. It is difficult to justify this practice on purely nutritional grounds. The infant's first nutritional need beyond that supplied by an adequate formula and vitamins is for iron and perhaps for some of the vitamins of the B complex, especially thiamine. Iron stores are sufficient for the first three or four months of life. Even these nutritional requirements could be met by medicinal administration.

"Some maintain that the early feeding of solid food is of psychologic advantage in that the baby can be accustomed to a wide variety of foods at an early age. It seems more likely that the practice is merely the result of competitive empiricism among both physicians and parents, a trend which began many years ago. It can be expected that the pendulum will shift back a little as more exact data are accumulated concerning the optimum time for introduction of solid food into the infant's diet. Considering the infant's nutritional requirements, three months of age would seem to be a reasonable time for routinely beginning solid foods. Exceptions can be made for rapidly growing, hungry infants who are not satisfied with full bottles of the milk feeding."

—LEE FORREST HILL, M. D.  
in *Journal Lancet*, p. 74, Mar. 1956

# CLEARANCE BY ALIMENTARY LUMEN CELLS

RICHARD P. SPENCER, *Lieutenant, MC, USNR*

**M**ETABOLITES and fluids ingested via the oral cavity are transported or "cleared" from the gastro-intestinal tract by cells lining its lumen. An evaluation of alimentary function is thus essentially a description of the workings of the luminal cells. Though we possess little information as to the composition of these units, we can infer much as to their activity and efficiency by studying the "clearance" of materials from the intestine to the body proper.

The term clearance (C) has been defined,<sup>1</sup> in renal physiology, by the equation

$$C = \frac{UV}{P} \quad 1$$

where U and P are the urine and plasma concentrations of the compound, and V is the urine flow in ml/min. Thus, C is an expression of the number of milliliters of plasma that could be made free of the metabolite. Because there is no homogeneous fluid bathing each segment of the alimentary tract, this equation is not directly adaptable to an evaluation of gastro-intestinal function. Moreover, a single measurement cannot adequately represent transport from the alimentary lumen. However, even with present crude technics, several parameters can be evaluated in studying the complex phenomenon of gastro-intestinal clearance.

Static clearance ( $C_s$ ) may be defined by the equation

$$C_s = \frac{Q_i - Q_e}{Q_i} \times 100 \quad 2$$

where  $Q_i$  and  $Q_e$  are the quantities ingested and excreted. The clearance figure thus obtained neglects the time factor (any interval may be designated); but, more fundamental, it is "static," for it gives little insight into the dynamics of the luminal cells. Rather, it represents the percentage of the ingested load taken up.

In the daily average body water economy, upon drinking 2,500 ml, one fifth of this quantity may eventually be passed by way of

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From U. S. S. Perry (DD 844), FPO, New York, N. Y. Lt. Spencer is now assigned to U. S. Naval Hospital, Newport, R. I.

the fecal stream, and  $C_e = 80$  per cent. Hence, 80 per cent of the water was cleared by the gastro-intestinal tract (although because of turnover and endogenously produced water, none of the excreted molecules may be identical with the ingested ones). In diarrhea, if the same quantity of water were taken, and 1,500 ml passed,  $C_e$  would be 40 per cent.

Let comparative clearance ( $C_c$ ) be determined by

$$C_c = \frac{C_{\text{pathologic}}}{C_{\text{normal}}} \times 100 \quad 3$$

Comparing the diarrheal and normal states (40 per cent/80 per cent  $\times 100$ ),  $C_c$  is 50 per cent. Such a comparison would make it appear that in the diarrheal illness, luminal units were only 50 per cent as efficient as normal (possible mechanisms being rapid transit or cellular damage). However, even severe episodes of diarrhea do not reduce lumen cell function by as much as 50 per cent. This gross exaggeration tends to point out the difficulty encountered with a "static" figure, and brings us to a more dynamic evaluation of lining cell activity and efficiency.

Knowing the amount of product (P) brought to the alimentary lumen, and the material excreted (E) after a suitable time interval, the two terms are related by the expression

$$E = P + \Sigma (p + s - a) \quad 4$$

where the summation figure includes the amounts presented to (p), absorbed by (a), and secreted by (s), the individual segments. Knowing P and E, we can calculate the total function of all segments for any substance we choose, and under any indicated conditions (such as before and after the tract is cleansed of bacteria); or, by studying the product at different levels of the tract, we can evaluate the contributions of the segments above our reference point. Generally, the summation figure will carry a negative sign, as greater quantities of a metabolite are absorbed, or subtracted, from the tract than are eventually excreted by it.

The major difficulty with the static clearance figure (and unfortunately, this is all we have available at the present for most nutrients) now becomes apparent.  $C_e$  neglected the secretion of the luminal units in calculating the quantity of substance handled by the outermost portion of the lining cells. Equation 4 considered the function of the cell to be the uptake of materials appearing at the luminal surfaces, whether the compound came from the segments above or from its own secretions.

To illustrate: The 2,500 ml of water taken orally are but part of the fluid bathing the lining cells. For, in addition, the tract is also presented with an additional 8,200 ml by the secretory ac-

tivities of the salivary glands, hepatic system, stomach, pancreas, and intestine.<sup>2</sup> Active clearance ( $C_a$ ), which represents the action of the luminal units on the total material presented to them, may be defined, during any specified time interval, by

$$C_a = \frac{(Q_i + Q_p) - Q_e}{(Q_i + Q_p)} \times 100 \quad 5$$

where  $Q_i$  and  $Q_e$  are as before, and  $Q_p$  represents the total quantity of the compound added to the lumen by the secretions of the lumen cells or the appendages of the alimentary tract. This expression can be presented in the terms of equation 4 as

$$C_a = \Sigma \left( \frac{a}{p + s} \right) \times 100 \quad 6$$

With a 2,500-ml water intake, an addition of 8,200 ml by the digestive organs, and a 500-ml fecal water loss,  $C_a$  would be 95 per cent. Hence, 95 per cent of the water is reabsorbed, an efficiency approaching that of the renal nephron. For the diarrheal illness previously discussed,  $C_a$  is 86 per cent. Comparatively,  $C_c$  is 90 per cent, not 50 per cent as determined by the static clearance concept of equation 2, and we can infer that in terms of the total water presented to the lumen cells, some 90 per cent of normal is still absorbed in the pathologic state (assuming that the secretions of the appendages are unaffected by the diarrheal agent, or by substituting proper figures if they are altered). It will be observed that  $C_c$  is a comparison between a pathologic and a normal state, and can be determined for any clearance parameter defined.

Additional information can be obtained as to lumen cell clearance by considering the alimentary tract and its appendages as a single unit membrane with two functions: (1) filtration of plasma to form gastro-intestinal secretions; and (2) reabsorption of the filtrate plus ingested fluids and nutrilites. In such a system the clearance gradient can be defined as

$$\begin{aligned} C_s &= \Sigma \left( \frac{a}{s} \right) & 7 \\ \text{or} \\ C_s &= \frac{(Q_i + Q_p) - Q_e}{Q_p} & 8 \end{aligned}$$

For the normal state discussed,  $C_s$  is 1.2 (that is, 1.2 times as much water is absorbed as is secreted), and in the diarrheal



episode, 1.1. Total clearance ( $C_t$ ), or the total amount of product handled by the lumen cells in both directions, is simply

$$C_t = \Sigma (s + a) \quad 9$$

$$C_t = (Q_i + 2Q_p) - Q_e \quad 10$$

If cardiac output were 2,500 ml of plasma per minute, and this flow was distributed with 30 per cent to the alimentary tract and 20 per cent to the kidneys, over a 24-hour period typical values of the clearance gradient and total clearance would be as calculated in table 1. The percentage of flow filtered was determined from

$$\text{Percentage filtration} = \frac{\text{volume of secretion}}{\text{plasma flow}} \times 100 \quad 11$$

TABLE 1. Comparison of filtration and absorption factors in the alimentary tract and kidney

Organ	Plasma flow ml/min	% flow filtered	$C_s$	$C_t$ in ml per 24 hours
Alimentary tract	750	0.8	1.2	$1.8 \times 10^4$
Kidney	500	20.0	0.99	$27.3 \times 10^4$

When one considers that the renal apparatus is designed for "losing" fluid to the milieu exterieur, while the alimentary tract "gains," the clearance gradient values of 1.2 for the alimentary tract and 0.99 for the kidney, both so close to unity, loom all the more remarkable. They depict the narrow range within which homeostasis exists, and the function of the lumen cells in the maintenance of this equilibrium.

Such an analysis may be profitably employed in the study of disorders of alimentary tract transport (whether too great a clearance, as iron in hemochromatosis or copper in Wilson's disease, or too little clearance, as vitamin B<sub>12</sub> in pernicious anemia). It also may have applications in the evaluation of materials which are recycled through the gastro-intestinal tract (as cholesterol and bile salts).

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# THE FINAL COMMON PATHWAY IN ULCER GENESIS

JACQUES L. SHERMAN, Jr., *Major, MC, USA*

**F**ROM 1942 THROUGH 1945 enough soldiers to have manned three combat divisions were separated from the Army of the United States because of gastric and duodenal ulcers.<sup>1-3</sup> The magnitude of the ulcer problem in the Armed Forces is further indicated by studies showing that the incidence of peptic ulcer in the Army is increasing.<sup>4</sup> It is said that from 5 to 10 per cent of the persons in most populations will develop an ulcer at some time in their lives.<sup>5</sup> In addition to a large morbidity, the death rate from gastric and duodenal ulcers is 5.6 per 100,000; more than 5 times that from poliomyelitis.<sup>6</sup>

This presents to medical scientists a challenge which does not appear to be capable of solution by better antacids or improved antispasmodic concoctions. The basis of current therapy still rests upon the empiric programs of the distant past: rest, "non-acrid diet," milk, and absorbent earths had all been prescribed in ulcer treatment by the seventh century A. D. Techniques of administration of these agents have been modified, and by 1905 alkali powders and antispasmodic drugs were added. Despite these refinements the recurrence rate of peptic ulcer remains at least 50 per cent, and the prevalence of the disease continues to increase throughout the Western world.

The classical questions: "Why does not the normal stomach digest itself?" and "why is a single place in the stomach deeply affected when all the other parts of the organ are in a state of perfect integrity?" remain unanswered, despite tremendous efforts. However, too much attention has been directed to secretory functions, stress, the psyche, and pepsin, and too little to the gastroduodenal mucosa. As a result, little actual progress has been made since 1772 when John Hunter suggested that some "living principle" which depends upon circulation of blood prevents digestion of the stomach during life.<sup>7</sup> One need not be a heretic to wonder whether a fresh approach to the problem is in order or whether it is time for the "expurgation of the intellect," which Francis Bacon suggested, in order to get rid of fixed ideas which blind us.

## THE APPROACH

The concept of a final common pathway as a method of thinking about peptic ulcer may be helpful in applying some of the data already available and in clarifying some of the current concepts of ulcer genesis. Peptic ulcer is probably a local manifestation of a constitutional reaction; acid-pepsin is capable of digestion and excavation of injured gastro-intestinal mucosa. Nonetheless, the actual process of ulceration must be initiated by focal loss of viability of groups of cells within the intestinal wall. This concept is basic and one must accept it in order to understand such phenomena as the localization of duodenal and gastric ulcers to small regions of these organs and the tendency of ulcers to remain of fixed size. The thesis has been expressed in statements such as these:

"The stomach does not digest itself when its circulation is adequate, when the tolerance of the cells to acid-pepsin is not exceeded, and when the nutritional condition is adequate for the regeneration and proliferation of the cells of the gastric mucosa and for mucous secretion.

"The intestine does not digest itself when its circulation is adequate, or when the diluting, neutralizing, and buffering reactions between the gastric juice, Brunner's secretion, intestinal juice, bile, and pancreatic juice are normally maintained within the limits of tolerance of the mucosa to acid-pepsin and active pancreatic juice."

". . . it is evident that the etiology of peptic ulcer disease in man should be sought elsewhere than in hyperactivity of the aggressive factor—rather in changes occurring in discrete areas of the gastric or duodenal wall . . . .

". . . it is conceivable that a deficiency may occur in the mucous-secreting activity of the columnar cells for metabolic or other reasons, e. g. an inadequate supply of one of the chemicals necessary for mucin synthesis or a diminution in the ability of the cells to effect this synthesis from the materials which are supplied them in the local circulation . . . .

"On the other hand, the balance between aggression and defense may be upset by discrete changes in the second line of defense. Such an upset would clearly result from any local physiological change which reduces the rate of reconstitution of the mucous epithelial layer after its impairment . . . . Reasoning back a step further, we ask what the factors may be which influence this rate of mucosal repair . . . . Among these are local ischemia of emotional origin, with its corollaries of localized anoxia, inadequate supply of nutritive elements, and the local accumulation of waste products of metabolism . . . ."

"The keystone for a proper theory of ulcer genesis will be found in identification of the mechanism responsible for local depression of mucosal resistance. When there is spontaneous loss of substance from any

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surface of the body, to form an ulceration, the basic cause of tissue dissolution is ischemia, whether the initiating process be infection, trauma, thermal influence or neoplastic change. Both clinical observation and experimental study have rendered it inconceivable that native gastric acid, however concentrated, could produce an ulcer under conditions of normal mucosal health."

These quotations were selected because the authors are well-known proponents of the "acid-pepsin" theory, the "mucus barrier" theory, and the "ischemia" theory of ulcer genesis, respectively. All make reference to the importance of mucosal resistance, and it is the purpose of the concept of a final common pathway to focus attention on factors which lead to local depression of mucosal vitality.

### THE FINAL COMMON PATHWAY

The characteristics of a final common pathway may be illustrated by the phenomenon of the contraction of fibers of skeletal muscle. When the complex protein actomyosin is exposed to adenosine triphosphate (ATP), shortening of the actomyosin fibrils occurs and skeletal muscle fibers contract. The final common path here is:

#### Actomyosin + ATP

This action is final since no other known event occurs before contraction; it is common because this path is used whether the initial stimulus arises in Betz cells, pain receptors, basal ganglia, or with the dropping of ATP on fibrils of actomyosin in vitro. A corollary of this concept is the inevitability of the event once the final path is activated.

This example illustrates the necessity for a careful search for a final common path (FCP), because the motor neuron is usually considered the "final common path" in muscle contraction. It is evident that this is far from being accurate, for there are several steps yet to be taken after stimulation of a motor neuron and before contraction. Also, a muscle fiber can be made to contract by chemical, thermal, or electrical stimulation independent of the motor neuron. Thus, the motor neuron is neither a final nor a common path. In addition, the stimulation of a given motor neuron need not cause contraction if transmission to the muscle is blocked, as with curare, for example. Thus its stimulation does not inevitably lead to muscle contraction.

The application of such a concept to the problem of the cause of peptic ulcer need not be difficult, although the actual elucidation of the pathway itself may be laborious. Starting with the premise that ulceration is initiated by focal devitalization of cells within gastric or duodenal mucosa, the search for an FCP begins

with a consideration of cellular damage. In general, important physicochemical effects on cells consist of: (1) solution or modification of the cell membrane; (2) change in osmotic pressure relationships; (3) alteration of electrical potential; and (4) alteration of the colloidal state of cell contents.

Obviously, agents or conditions which could produce any or all of these effects are numerous. Since the great majority of stomach and duodenal ulcers form in such restricted areas of these organs, we must seek a mechanism which can produce tissue damage and which can do so both locally and diacretely.

### THE MECHANISM

The three great physiologic systems which may be capable of this double action are the endocrine complex, the nervous system, and the circulatory system. The endocrine system is involved in the "stress" response and in the reactions of the gastro-intestinal tract seen in peptic ulceration. Gray et al.<sup>12</sup> have outlined one pathway by which these influences are mediated. But the endocrine disturbance, whatever its nature, is not capable of the fine, localized action necessary to explain focal devitalization of cells in specific areas of the stomach and duodenum. There are no known or suggested hormonal actions which could be an FCP leading to apocific cellular damage; hormones are basically biologic catalysts and appear to be trophic only to endocrine tissues.

The nervous system, particularly the autonomic division, could provide either an FCP or a direct influence on one, for it is capable of response to generalized and varied stimuli, and it can direct actions to local areas. However, like the action of hormones, the effects of nerve impulses of the autonomic system are on end organs such as blood vessels, muscle fibers, and secretory glands and have no primary relationship to the viability of tissue.

The vascular system, like the nervous system, responds to general stimuli and can act locally. More important are the facts that its function is concerned specifically with cellular integrity and that its dysfunction may lead to rapid tissue death or loss of viability. The vascular system meets all of the requirements of a primary ulcerogenic pathway: it participates in generalized body responses; it is readily influenced by "stress" and by psychic phenomena; it has a degree of independence from other gastro-intestinal functions; it is capable of local control and action; and it is specifically concerned with vitality of cells in all parts of the body.

In their review of the current status of a vascular basis for the ulcer process, Palmer and Buchanan<sup>1</sup> pointed out that it is just 100 years since Virchow and Rokitsky first incriminated the vascular system as the initiating mechanism of ulcer. During this time

many vascular theories have been presented but have not won acceptance because of their failure to demonstrate any occlusive mechanism or arterial disease which could explain focal devitalization. Recent anatomic and physiologic studies on the circulation have expanded the knowledge of the location, extent, and control of the vast system of arteriovenous anastomoses which exist throughout the body. This system is of such proportion that many of our concepts of vascular physiology and general pathophysiology must be revised. The presence of functioning arteriovenous shunts in the gastric and duodenal wall<sup>11</sup> has led to a new approach to the problem of the specific localization of ulcers, and we are at present carrying out investigations along these lines.

The final common pathway in ulcer genesis lies distal to the vascular system and may be conceived of as being a distortion of one of the normal functions of the circulation. Although it is tempting to assume that hypoxia\* is the condition produced by circulatory disturbance leading directly to focal tissue devitalization, actual identification of the FCP still remains to be accomplished. Important functions, such as the provision of nutrients for function and repair, the removal of CO<sub>2</sub> and other wastes, the provision of substrate for enzymatic actions, the regulation of osmolarity, and others, need to be studied as possible components of a final path.

However, a satisfactory working hypothesis for the present is that hypoxia does represent the aberration of normal function which is an FCP in the genesis of ulcer. This hypothesis does not discourage investigation even more distally in the search for actions which are more closely related to the onset of tissue destruction. It is known, for example, that hypoxia causes the activation of native proteolytic enzymes in the cell.<sup>12</sup> This or other effects of hypoxia may be eventually identified as the actual FCP, and the hypothesis will have to be modified accordingly.

Supposing hypoxia to be the FCP, one may work centrally to establish the influences on the FCP. Disturbances of circulation, for instance, may lead to hypoxia by producing local ischemia or local stasis. Both mechanisms lead to hypoxia—the first to deprivation hypoxia, the second to “stagnant anoxia.” In this way, it may be possible to understand some of the apparently conflicting observations on the presence of blanching or reddening of the mucosa in states associated with ulcer development. Thus, one may look for specific influences which can cause the production of local ischemia or of local stasis, such as nervous or neuro-

\*The term “anoxia” actually means without oxygen, although common usage has given it the meaning of “oxygen want.” “Hypoxia” designates a subnormal supply of oxygen and is used here in this general sense.

humoral effects on arterioles, arteriovenous anastomoses, or venules. In this way the concept directs a logical investigation of mechanisms of transmission of ulcerogenic influences and discourages simple classification of these influences as an approach to the "cause" of ulcer.

### DISCUSSION

Recently a plea was made for "reason and imagination"<sup>11</sup> in the understanding of chronic peptic diseases. It is my belief that, unless reason is guided by the rules of logic, and unless imagination is confined by the requirements of the scientific method, we will not readily approach a better understanding of peptic ulcer. No explanation of ulcer genesis can be considered complete unless it can show how the responsible factors lead to localized cellular destruction in the gastric or duodenal wall, allowing acid-pepsin to digest the previously resistant tissues. The concept of a final common pathway immediately preceding this focal devitalization can help to clarify thinking in evolving any general theory of ulcer formation. Without doubt, psychic disturbances are important in the genesis of peptic ulcer, but it will serve little purpose to catalog various types of psychic dysfunctions without also attempting to trace these influences from the psyche to the FCP. This same requirement should apply to all theories of the causes of ulcer and the touchstone for any theory must be its ability to explain activation of an FCP. Such a requirement will direct attention away from the ulcerogenic influences themselves and will emphasize the mediation of these influences, an approach infrequently used in recent research.

The importance of the circulation in the various pathways leading to the FCP needs emphasis. In the foregoing quotations on causes of ulcer, each author indicated the opinion that, basically, the circulatory system could be responsible for the loss of defensive properties of the gastroduodenal mucosa. There are others with similar opinions who might have been quoted—authors who believe that the neurogenic influences are the most important, some who feel that allergic factors play an important part in ulcer genesis, and others who are impressed with the importance of constitutional factors. Much remains undone in a study of arteriovenous anastomoses in the gastro-intestinal tract, but enough information is available to indicate the fact that within this extensive system, which is under both neural and humoral control, lies the capability of great modification of mucosal blood flow. The flow of capillary blood seems to be under the control of these arteriovenous shunts; their size, number, and location allow them to act generally or locally and to regulate the rapid transfer of large amounts of blood within a motile organ system such as the gastro-intestinal tract. These characteristics fit so well the re-

quirements of a pathway which could activate an FCP that there has been a re-awakening of interest in the concept of a vascular basis for peptic ulcer.

### SUMMARY

Peptic ulceration depends upon acid-pepsin digestion of a mucous membrane normally resistant to digestion. The major effort in investigation of the genesis of ulceration must be upon the factors that render this mucous membrane susceptible to such digestion. Since, generally, this digestion takes place in limited areas of the stomach and duodenum, these causative factors must be capable of exerting their effects locally as well as being able to produce tissue devitalization.

The concept of a final common pathway (FCP) has been outlined, proposing that some basic pathologic mechanism immediately precedes focal tissue devitalization, allowing acid-pepsin digestion to produce an ulcer in the region of the devitalization. A working hypothesis—that hypoxia is the FCP—is presented, and reasons are given for believing that circulatory disturbances are responsible for the localization and the hypoxia.

It is suggested that all theories of the causes of peptic ulcer be required to include possible mechanisms by which ulcerogenic influences are transmitted to an FCP. This may tend to guide and restrict thinking about causative factors in peptic ulceration and may help to clarify the reasons for phenomena that have been observed during this past century by clinician, research worker, physiologist, and pathologist.

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"The existing evidence indicates that the prophylactic use of antibacterial agents is of value under the following conditions:

1. In contaminated wounds of violence, including burns.
2. In elective surgical procedures performed through, or in, contaminated areas such as the gastrointestinal, respiratory, or genitourinary tracts.
3. In patients with associated derangements of the urinary tract who undergo surgical operations.
4. In patients with indwelling catheters.
5. In persons with pre-existing valvular heart disease who sustain injuries or undergo operations of the oral or pharyngeal cavities.
6. In patients undergoing emergency surgery in the presence of associated but unrelated infections such as acute tonsillitis.
7. For preparation of the gastrointestinal tract.
8. For elderly people with chronic pulmonary disease who undergo surgical treatment."

—WILLIAM A. ALTEMEIER, M. D.,  
WILLIAM R. CULBERTSON, M. D.,  
and MARK VETTO, M. D.  
in *A. M. A. Archives of Surgery*  
p. 5, July 1955

# RECENT ADVANCES IN SUPPOSITORY MEDICATION

ANTHONY F. CACCHILLO, *Private First Class, USA*

**A** DOSAGE form that boasts a history as far back as the time of Hippocrates, and to which reference was made in Papyrus Ebers, is the suppository. From earliest times man has used this practical and convenient route of drug administration, with varying degrees of success. In the chemotherapeutic era of today, important opportunities remain for suppository therapy using new drugs. This method is particularly useful when other routes are unsuccessful, lacking, or impractical.

Advantageous localized treatment of the rectum, urethra, and vagina is accomplished when the drug is not absorbed by the mucous membranes. Emollient preparations indicated following surgical intervention of the rectum, in pruritus ani, vaginitis, and hemorrhoids provide satisfactory relief in this dosage form.

When systemic action is desired, those patients in whom oral administration produces nausea and vomiting and wherein intravenous therapy presents a problem are ideal subjects for routine suppository medication. This method of obtaining satisfactory blood levels is particularly well-suited and beneficial in: (1) Infants and children to introduce salicylates and other medicaments of therapeutic value. (2) The class of persons unable to swallow capsules or tablets, or in comatose condition and unable to receive conventional treatment. (3) The administration of drugs that are inactivated by digestive fluids of the stomach or intestine. (4) Those cases in which the drugs interfere with digestive functions.<sup>1</sup>

Information in the literature relative to satisfactory suppository bases, new formulas, and uniform dosage schedules is scanty and incomplete, and this valuable method of drug administration has not received its due attention and recognition. Only recently have great strides been made in the development of the suppository as a unique and thoroughly practical method of administering drugs.

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From Central Dispensary, Fort Bliss, Tex. Private First Class Cacchillo is now assigned to Enl. Detach. 8059AU, Tokyo Army Hospital, APO 500, San Francisco, Calif.

Blumo and Nohara<sup>3</sup> reported that the absorption of sodium salicylate in rabbits is greater from the rectum than from oral ingestion. In another study<sup>3</sup> six drugs were tested for absorption in 63 normal persons. Five of these drugs, viz., sodium salicylate, chloral hydrate, methylene blue, atropine sulfate, and morphine sulfate were absorbed in therapeutic quantities more quickly by rectum than when given orally. Other investigations<sup>4,5</sup> revealed that higher concentrations of salicylate were obtained in the blood of human subjects by rectal than by oral administration.

A new type suppository base formulated by using varieties of Cerbowax (brand of certain polyethylene glycols) has recently been cast into the medical-pharmaceutical spotlight. The characteristics of these compounds, of the general formula  $\text{HOCH}_2(\text{CH}_2\text{OCH}_2)_x\text{CH}_2\text{OH}$ , are such that undesirable properties of other type bases are excluded. They are unctuous, waxlike solids that dissolve in water, forming transparent solutions. They also are soluble in many organic solvents, do not hydrolyze or deteriorate on storage, and will not support mold growth.<sup>6</sup> Unlike cocoa butter, the polyethylene glycols require no refrigeration, and products of great pharmaceutical elegance which are esthetically acceptable to the patient can be produced by their use.

After having studied suppository bases and absorption via rectal administration,<sup>1</sup> I am confident that the polyethylene glycol type base will reach new heights of usefulness in medicine. To determine relative degrees of absorption, 11<sup>\*</sup> male subjects on one day, for three successive weeks, were administered 0.64 gram of acetylsalicylic acid in suppository form in bases of cocoa butter, glycerinated gelatin, and polyethylene glycol (table 1). During the fourth week, two (0.32 gram) aspirin tablets were given orally. Plasma levels of salicylate were determined two hours after administration. Absorption from polyethylene glycol suppositories was found to satisfactorily approach that from orally administered tablets.

The purpose of this article is to bring to the attention of Medical Corps personnel recent great advances in suppository medication, and to invite a re-evaluation of its usefulness. It is hoped that presentation of the following formulas and compounding instructions will stimulate increased manufacturing by pharmacists and prescribing by physicians, with benefit to members of the armed services requiring medical treatment.

### FORMULATION

These formulas are based on a standard suppository weight of 4.0 grams. The weight of the suppositories produced by the

\*Results on two of these subjects were discarded because they could not retain the suppositories made with glycerinated gelatin.



*Aminophylline suppositories*

To make 75 suppositories; 0.49 gram (7½ grains)

Grams

Aminophylline .....	36.6
Polyethylene glycol 6000 .....	105
Polyethylene glycol 1540 .....	79
Polyethylene glycol 400 .....	79

Make a paste of aminophylline powder with liquid polyethylene glycol 400. Melt remaining polyethylene glycols on water bath and add paste quickly with stirring. Do not overheat; pour. Do not refrigerate.

*Pentobarbital suppositories*

To make 36 suppositories; 0.13 gram (2 grains)

Pentobarbital sodium .....	4.68 grams
Polyethylene glycol 6000 .....	55 grams
Polyethylene glycol 1540 .....	42 grams
Polyethylene glycol 400 .....	42 grams
Yellow color .....	2 drops

Mix pentobarbital sodium with polyethylene glycol 400 and stir until in solution; melt remaining polyethylene glycols, add, and pour into mold. Do not refrigerate.

## SUMMARY

Recent developments in suppository bases, and the rationale behind increased usage of this route of administration are reported. Plasma level studies show that absorption of many drugs from polyethylene glycol suppositories compares favorably with absorption following oral administration. The advantages of this type base over other bases include: (1) greater degree of absorption, (2) nonrequirement for refrigeration, (3) complete stability, and (4) greater pharmaceutical elegance and patient acceptability.

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# CHRONICITY IN "ACUTE" VASCULAR PURPURA

DANIEL J. SHEEHAN, Colonel, MC, USA  
ROBERT C. HUNTER, Jr., Lieutenant Colonel, MC, USA

**A**LTHOUGH vascular purpura (Schönlein-Henoch's Syndrome) is usually considered an acute condition, it has the potentiality for stubborn chronicity manifested by either a relapsing or an unrelentingly persistent pattern. It is our aim to present our experience with 6 patients during a two-year period in order to re-emphasize some of the chronic clinical aspects and to lend some support to the limited and judicious use of cortisone in the management of this disease.

## CASE REPORTS

**Case 1.** This 35-year-old housewife had a 17-year history of multiple difficulties. In 1939, she developed episodes of diarrhea and sore throat accompanied by pain in the epigastrium at 2- to 3-week intervals. In 1941, she was diagnosed as having ileitis and had a laparotomy performed following which she was told that her right ovary had been resected for cysts. In 1944, some five years after the onset of her abdominal symptoms, she developed multiple joint pains with definite swelling and erythema of both knees. Epigastric pain usually accompanied the joint symptoms. During an episode requiring hospitalization in 1945, severe erythema nodosum appeared and was followed within one week by extensive erythema multiforme. Her temperature was 103°F. Initial skin involvement lasted five weeks and gradually subsided leaving "bluish spots" which persisted for several weeks. Late in 1945, for the first and only time, she developed typical purpura and petechiae in the popliteal fossae and about the elbows. There was elevation of temperature on this occasion. Then followed hospitalization in nine different hospitals over a period of almost two years.

Since 1947, she was treated on an outpatient status. She continued to have symptoms of joint pain, epigastric burning, bouts of diarrhea, and febrile attacks. She was given such diagnoses as rheumatic fever, rheumatoid arthritis, and myositis and also had two abdominal operations.

During these years her gastric analyses, gastro-intestinal roentgenographic series, barium enemas, cholecystograms, pyelograms, and electrocardiograms, roentgenograms of the peripheral joints, spine,

From Tripler Army Hospital, Honolulu, T. H. Col. Shee'  
Army Hospital, Fort Sam Houston, Tex.

and sacroiliac joints, urinalyses, blood cell counts, and numerous blood chemistries were, with the exception of a slight anemia which was reported on one occasion, within normal limits.

During the past two years, large raised erythematous plaques in the skin, preceded by a burning and stinging sensation of the involved areas, have accompanied her joint and bowel symptoms. A slowly mounting blood pressure, averaging 150/100 mm Hg, also had developed. The kidneys continued to remain free of involvement, as determined by studies of urinary sediment. A slight improvement in the joint and skin manifestations occurred during the summer months. However, she never was free of symptoms for any lengthy period.

Case 2. A 37-year-old housewife was first seen 24 months ago complaining of a purpuric rash on the lower extremities recurring over a period of 17 years. The onset occurred two weeks after an episode of antral sinusitis. The lesions began as pruritic wheals which then became hemorrhagic. They were always most marked about the lower legs, but occasionally extended upward as far as the waist. She noted painful swelling of the knees, elbows, and wrists with the more severe recurrences. She frequently had diffuse swelling of both legs. Throughout the course of her illness, she thought that exposure to cold aggravated her symptoms. In 1942, albuminuria and hematuria occurred for the first time, and has recurred from time to time since. At times she has had gross hematuria which she correlates with exposure to cold. In 1946, she was told at the Mayo Foundation that she had Schönlein's purpura. She slightly improved after 1952, which she attributed to the equable climate of Hawaii. However, she continues to have fresh purpuric manifestations from time to time, and to show evidence of renal involvement. She has been observed in many hospitals and clinics and has been told repeatedly that her platelet count was normal, and that she had a negative cold agglutination test. There was no other history of personal or family allergic manifestations. Syphilitic infection was denied.

Physical examination showed a healthy appearing woman. There were numerous large areas of brown pigmentation about the feet and ankles and extending halfway up the leg. There were several ecchymotic areas and slight edema about the ankles. The capillary fragility test on the arm was positive.

Bleeding time was 1 minute and 50 seconds; clotting time, 4 minutes and 50 seconds; platelet count, 165,000; hematocrit, 49 ml per 100 ml; white blood cell and differential counts, normal; and sedimentation rate, 2 mm per hour. The cardiolipin test was negative. Repeated urinalyses showed a specific gravity up to 1.030. Albuminuria was intermittently present up to 2 plus. At times the urine was grossly bloody and loaded with red blood cells, while at other times it showed no red blood cells on routine microscopic examination. There was no hemoglobinuria. Blood urea nitrogen and an intravenous pyelogram were





with cortisone and had only a partial remission but she had to leave the hospital because of transfer of her husband.

**Case 4.** A 47-year-old veteran was admitted to the hospital on 20 July 1953 with fever, nausea and vomiting, and severe abdominal pain radiating to the back. He had had innumerable similar attacks of a few hours to several days over a period of about 10 years. The location of the pain was variable, and at times was referred to his chest. The onset on several occasions was heralded by syncope lasting from a few minutes to a half hour. He had had hematemesis and melena associated with the pain on one occasion about six years previously.

Since 1938, he had been told that his blood pressure was high. He had mild wheezing, especially at night, for 10 years, interspersed with rare attacks of typical asthma. From 8 to 10 years he had recurrent mild aching and swelling of his joints, usually coinciding with the abdominal pain. From 5 to 6 years he had often noted slight pitting edema of the ankles in the evening. For 5 years he noted purpuric lesions. These would begin as tender, pruritic nodules which would develop into hemorrhagic areas several centimeters in diameter. Initially purple, they would gradually fade into yellow and then disappear. A small slough occasionally appeared in the center of some, leaving an ulcer which always healed promptly. He never had less than a half-dozen purpuric lesions at any time. He experienced episodes of giant urticaria, accompanied at least once with edema of the glottis, which responded to epinephrine while preparations were made for emergency tracheotomy. Most of the acute attacks were accompanied by fever, with temperatures of 102°-104°F, but he often had less severe fever and was usually able to work with a temperature as high as 101°F. He had been hospitalized many times, usually as an emergency, and had been extensively studied from the cardiovascular and gastrointestinal aspects. Diagnoses of peptic ulcer, gall bladder disease, psychogenic gastro-intestinal reaction, probable pancreatitis, angina pectoris, cardiac neurosis, and diverticulitis of the colon had been made on various occasions but none had been substantiated.

Physical examination showed a somewhat obese white man who appeared acutely ill. His temperature was 99.2°F; pulse, 100; and blood pressure, 190/110 mm Hg. His abdomen was diffusely tender with guarding and some rebound tenderness in the left lower quadrant. The retinas showed grade I hypertensive changes. There were occasional expiratory wheezes throughout both lungs and a 1 plus pitting edema of the ankles. In the skin of the trunk and legs, there were six to eight ecchymotic areas measuring from 3 to 6 cm in diameter and varying from purple to yellow in color. The capillary fragility test was positive.

The following studies were negative or within normal limits: roentgenogram of the chest, scout film of the abdomen, cholecystogram,

y 1956)

## ACUTE VASCULAR PURPURA

astro-intestinal series, proctoscopy, repeated blood counts, platelet counts, bleeding, clotting, and prothrombin time tests, smears, repeated urinalyses (maximum specific gravity 1.020), repeated blood cultures, L.E. cell preparation, serum amylases, gastric analysis, calcium, and a liver profile including a sulfobromophthalate sodium reaction test. Barium enema showed diverticulosis with evidence of diverticulitis. Biopsy of a subcutaneous nodule and underlying muscle showed a lipoma and normal muscle.

During the first week in the hospital the patient remained severely ill, with severe nausea and vomiting, temperature up to 102°F, and pain requiring opiates for partial relief. His third pressure reading stabilized in the vicinity of 140/95 mm Hg. He was diagnosed at this point. He was treated with a drip which gave him complete relief of his symptoms within two days. His ankle edema disappeared and he lost six pounds in weight. Once treatment was started, no new purpura appeared, and the condition of the old disappeared within 10 days. The patient stated that he felt better than he had for many years. One month later, after ACTH had been discontinued and while receiving 50 mg of cortisone daily, he had a recurrence of abdominal pain with severe diarrhea and passage of about a pint of red blood in his stools. The next day, giant urticaria appeared on his upper lip and around the eyes. All of these symptoms subsided within two hours after an additional dose of 100 mg of cortisone had been given.

After discharge from the hospital, his course continued much as it had previously. Attempts to manage his disease with prolonged cortisone therapy were hindered by a gradually increasing hypertension with blood pressures of about 200/130 mm Hg. He required a daily dose of from 125 to 200 mg of cortisone for effective control of his symptoms. It was therefore reserved for the more severe attacks, many of which were aborted by 100 to 150 mg taken on the patient's own initiative. He carried 250 mg with him at all times, which usually sufficed for one to two weeks' use. He continued to work effectively, often in the face of surprisingly severe symptoms, but still required hospitalization on two occasions during the past year, once with severe emesis. Antihistaminic and xanthine drugs did not seem to help him. Sympathomimetic drugs, particularly epinephrine and ephedrine, have seemed to be beneficial, but their action was inconsistent and questionable.

He was readmitted to the hospital in May 1955 with a left hemiplegia which had its onset during sleep a few hours previously. This had been preceded for two weeks by increasing pressure and abdominal pain. His blood pressure on admission was 200/130 mm Hg, with a prompt drop to 150/90 mm Hg on bed rest, morphine, and cortisone. Recovery from paralysis was almost complete.

**Case 5.** A 34-year-old housewife was admitted to the hospital on 10 December 1953 complaining of abdominal pain and swelling of the face, abdomen, arms, and legs.

Her history went back to 1930 when she noted swelling of the lips and abdominal pain following a mastoidectomy. With her first menstrual period in 1932, she had acute laryngeal edema which subsided while tracheotomy was under consideration. In 1939 she developed acute abdominal pain which was thought to be appendicitis. At operation, about a liter of clear yellow fluid was found in the peritoneal cavity. The proximal three feet of the jejunum were thickened, edematous, and had a reddened and slightly granular serosa. The appendix was removed prophylactically and she made an uneventful recovery.

In 1946, she began to have recurrent episodes of giant urticaria lasting from a few hours to several days. They tended to appear with her menstrual periods or with emotional tension. All parts of the body were subject to involvement, particularly the legs. She also sustained several attacks of acute laryngeal edema severe enough to require hospitalization. Also since 1946, she has had repeated attacks of severe, colicky, abdominal pain and swelling, occasionally accompanied by nausea and vomiting or diarrhea. There has been no bleeding except secondary to hemorrhoids.

In June 1947, the patient underwent emergency laparotomy in a civilian hospital for obstruction of the small bowel. The ileum was found obstructed and adherent to a granulomatous mass at the upper end of the old laparotomy scar. The mass was 3 cm in diameter and 1 cm thick, and showed "caseation" in the center. The peritoneal cavity contained a large amount of straw-colored fluid. The jejunum and proximal ileum were edematous and exhibited numerous 1-mm, white plaques on the serosa. Pathologic examination of the excised portion of the scar showed "nonspecific granulomatous tissue." A guinea pig inoculated with the ascitic fluid was negative for tuberculosis.

In December 1948, following an attack of severe abdominal pain, distention, and vomiting, an exploratory operation was performed for probable bowel obstruction. The peritoneal cavity again contained a moderate amount of straw-colored fluid. There was extensive edema of the jejunum, but no other abnormal findings were reported except for a very few fine adhesions. She made an uneventful recovery.

She was hospitalized at least a dozen times from 1947 through 1949 because of abdominal pain or laryngeal edema. In 1947 and 1951, during two pregnancies which were carried to term successfully, she had no manifestations of giant urticaria or pain. In 1952, a bilateral oophorectomy was performed, but the expectation that it might alleviate her symptoms was not realized.

For six months before her latest hospital admission, she had been followed as an outpatient in this hospital. She had continued to have bouts of angioneurotic edema or abdominal pain approximately every

two weeks, but the two symptoms were rarely present simultaneously. As previously, she has been treated with epinephrine in oil, antihistaminics, mercurial diuretics, intravenous calcium gluconate, and testosterone with some apparent benefit at times. A superimposed hyperventilation syndrome further confused the clinical picture.

Physical examination at the time of her latest hospital admission showed a well-nourished white woman who appeared only mildly acutely ill. There was marked localized edema of the face, abdomen, arms, and legs, and mild, generalized abdominal tenderness. A faint systolic murmur was heard best in the third and fourth interspaces just to the left of the sternum.

The following studies were within normal limits: roentgenogram of the chest, cardiogram, urinalysis, stool smears and cultures, cholecystogram, gastro-intestinal series, barium enema, intravenous pyelogram, and fasting blood sugar. Her white blood cell count was 11,600 per  $\mu$ l with 82 per cent polymorphonucleocytes. Her hemoglobin was 12.1 g per 100 ml, and the sedimentation rate, 13 mm per hour. Her symptoms were not relieved by epinephrine, but were in three days by ACTH given by intravenous drip. She was discharged four days later.

During the next three months the patient was given cortisone orally in doses of from 25 to 100 mg per day. She continued to have edema off and on, but seemed to have obtained some relief from the abdominal pain on this program. She was readmitted at the end of this period for the purpose of discontinuing cortisone because of the impending transfer of her husband. On this occasion, she had edema of the left side of her face, left forearm, and both legs. She complained also of pain in the left ear, which the otologist attributed to vasomotor rhinitis and eustachian salpingitis. ACTH was given for 3 days after the cortisone was discontinued. There was no exacerbation of her symptoms in the process. She was given cortisone to carry with her for emergency use in the event of another attack of acute laryngeal edema, which had previously responded poorly to epinephrine, but dramatically to cortisone.

Case 6. A 29-year-old physician with a history of asthma and hay fever in childhood was admitted to this hospital on 28 January 1954. He was well until 3 weeks before admission when he had a mild upper respiratory infection for which he was not given antibiotics. One week later he first noted petechiae on his ankles associated with burning epigastric pain unrelated to meals. Two days later his knees, ankles, elbows, and left metacarpophalangeal joints became red, painful, stiff, and swollen. Six days before admission an effusion of the left knee was tapped. A clear sterile fluid was obtained. Initially he was treated for four days with 300 mg of cortisone orally with excellent symptomatic improvement. However, when the medication was stopped, all of his symptoms recurred and, in addition, the calf of his left leg became swollen and tender.

Case 5. A 34-year-old housewife was admitted to the hospital on 10 December 1953 complaining of abdominal pain and swelling of the face, abdomen, arms, and legs.

Her history went back to 1930 when she noted swelling of the lips and abdominal pain following a masroidectomy. With her first menstrual period in 1932, she had acute laryngeal edema which subsided while tracheotomy was under consideration. In 1939 she developed acute abdominal pain which was thought to be appendicitis. At operation, about a liter of clear yellow fluid was found in the peritoneal cavity. The proximal three feet of the jejunum were thickened, edematous, and had a reddened and slightly granular serosa. The appendix was removed prophylactically and she made an uneventful recovery.

In 1946, she began to have recurrent episodes of giant urticaria lasting from a few hours to several days. They tended to appear with her menstrual periods or with emotional tension. All parts of the body were subject to involvement, particularly the legs. She also sustained several attacks of acute laryngeal edema severe enough to require hospitalization. Also since 1946, she has had repeated attacks of severe, colicky, abdominal pain and swelling, occasionally accompanied by nausea and vomiting or diarrhea. There has been no bleeding except secondary to hemorrhoids.

In June 1947, the patient underwent emergency laparotomy in a civilian hospital for obstruction of the small bowel. The ileum was found obstructed and adherent to a granulomatous mass at the upper end of the old laparotomy scar. The mass was 3 cm in diameter and 1 cm thick, and showed "caseation" in the center. The peritoneal cavity contained a large amount of straw-colored fluid. The jejunum and proximal ileum were edematous and exhibited numerous 1-mm, white plaques on the serosa. Pathologic examination of the excised portion of the scar showed "nonspecific granulomatous tissue." A guinea pig inoculated with the ascitic fluid was negative for tuberculosis.

In December 1948, following an attack of severe abdominal pain, distention, and vomiting, an exploratory operation was performed for probable bowel obstruction. The peritoneal cavity again contained a moderate amount of straw-colored fluid. There was extensive edema of the jejunum, but no other abnormal findings were reported except for a very few fine adhesions. She made an uneventful recovery.

She was hospitalized at least a dozen times from 1947 through 1949 because of abdominal pain or laryngeal edema. In 1947 and 1951, during two pregnancies which were carried to term successfully, she had no manifestations of giant urticaria or pain. In 1952, a bilateral oophorectomy was performed, but the expectation that it might alleviate her symptoms was not realized.

For six months before her latest hospital admission, she had been followed as an outpatient in this hospital. She had continued to have bouts of angioneurotic edema or abdominal pain approximately every

but not recently active. In any patient with pigmentation of this type not readily explainable by the more common causes, the possibility of vascular purpura should be considered.

Capillary fragility tests are unpredictable and apparently not always related to the severity of the purpura. The test may be positive in patients with mild skin involvement and negative in those with extensive purpuric lesions. There does seem to be a tendency, however, for the skin manifestations to be greatest in the dependent portions or over the pressure areas of the back. Ackroyd<sup>4</sup> mentioned that bright red lesions in some instances appeared 12 to 24 hours after slight local trauma such as stroking with a blunt rod or intradermal injection between attacks.

**Gastro-intestinal.** The gastro-intestinal component is generally manifested by abdominal pain of a colicky, sometimes burning type varying in severity, duration, and location. There usually is vomiting and occasionally hematemesis with appreciable blood loss. Bouts of diarrhea sometimes constitute a prominent complaint, and bloody stools and melena can be exsanguinating. The severity of the gastro-intestinal manifestations may suggest intestinal obstruction, perforation of a viscus, intussusception, pancreatitis, appendicitis, peritonitis, and other acute intra-abdominal situations, resulting in unnecessary surgical exploration. The lesion most commonly found at operation was an extravasation of blood or serosanguineous fluid into the wall of the small intestine.<sup>5</sup> In one of our patients (case 5), the surgeon stated that he found a "long section of edema of the bowel."

In the chronic form, the gastro-intestinal pattern is one of recurrent acute episodes often synchronized with joint and/or skin manifestations. The attacks are usually brief and self-limited but may also occur in rapid succession and of sufficient duration to cause total incapacity. The concern of the patient over repeated undiagnosed abdominal crises, and the subjection of these patients to unnecessary surgical exploration can be minimized only by developing an awareness of this disease in both its acute and chronic aspects. Reportedly an occasional patient required surgical intervention because of hemorrhagic ulcers with perforation or intussusception with obstruction.<sup>5</sup> However, Pratt, in his extensive review, cited the occurrence of only one case of intussusception. The gastro-intestinal component may occur with, recur with, or even antedate the onset of all other manifestations. It may occur simultaneously with combinations of joint, skin, renal, or other less frequently involved organ or system. A careful history will help more than any other single factor when attempting to fit together the manifestations in joint, skin, and gastro-intestinal tract that occur as apparently unrelated single episodes, or when the patient stresses only the most troublesome involvement to the exclusion of other features.

Physical examination showed an alert patient who was not acutely ill. His temperature was normal. There were numerous petechiae about both ankles as well as several larger ecchymotic areas. The ankles, knees, and left elbow were swollen, tender, and had limited motion. The white blood cell count was 16,400 per  $\mu$ l with a normal differential count. The sedimentation rate was 28 mm per hour. Electrocardiograms on two occasions were normal. The kidneys seemed normal.

Cortisone was reinstituted at 300 mg per day with a gradual reduction to 100 mg per day for two and one-half weeks, followed by ACTH for one week. The patient had lower abdominal cramping pain and diarrhea for the last three days of his reduced cortisone treatment. Two days after the ACTH was discontinued, he had a mild flare-up of joint pain which lasted only a few days. After three weeks of treatment because his symptoms and findings subsided and he appeared well he was discharged from the hospital. A month later, he had a more severe recurrence of joint pain and petechiae which necessitated re-treatment with cortisone for about one month without loss of time from duty. He remained well for the past year.

### CLINICAL ASPECTS

As in the acute, self-limiting form, the chronic clinical manifestations are diversified not only in different patients, but at different times in the same patient. An awareness of these pleomorphic qualities makes the disease more common than is generally appreciated. Our two-year experience reported here does not differ from an occurrence rate standpoint with previous experience. Oeler<sup>1-3</sup> originally, and later Pratt,<sup>4</sup> emphasized and completely documented the chronic potential and the extremes in clinical variations in this disease.

**Skin and Mucous Membranes.** Of the systems involved, the skin perhaps offers the widest spectrum of variability of lesions. Urticarial wheals with or without itching may occur unaccompanied by or interspersed with other lesions. The itching, if present, is usually slight and sometimes described as a burning or stinging sensation just prior to the actual appearance of the wheal. Purpura may vary from scant and discrete embolic-type lesions level with the surrounding skin to relatively massive exudativum multiforme involvement with central areas of purpura and necrosis and a tendency to coalesce. Localized areas of angioneurotic edema may also appear initially or at any time during the course of the disease.<sup>1-4</sup> This potentiality was illustrated by cases 4 and 5. From the standpoint of duration, lesions may be minimal and transient throughout the entire course, or may come in successive crops if the disease waxes and wanes in a chronic relapsing form. In some instances it is possible to note areas of brownish pigment, sometimes even large coalescing areas (case 2) when the skin has been significantly involved

tension (cases 2, 4, and 6). In one of these (case 4), a recent cerebrovascular episode was immediately preceded by increasing purpura and bouts of abdominal pain.

### TREATMENT

The treatment of this disease leaves much to be desired. Until the advent of the steroids, most therapeutic measures offered nothing superior to the passage of time except for an occasional patient in whom there was claimed to be an etiologic relationship to some specific allergenic agent. It is generally accepted that the steroids do have a favorable effect, at least on the immediate acute symptoms of the disease.<sup>7-10</sup> However, this method of management is not entirely satisfactory inasmuch as lack of benefit has been reported, particularly in regard to renal involvement.<sup>6, 11, 12</sup> Cortisone as utilized in our patients was not instituted for its permanent curative value, but employed as a temporary modifying agent similar to its use in bronchial asthma, collagenous disorders, and other disease states. It may add something of value to the management of the patient even if only to influence favorably the acute recurrent episode arising in the chronically afflicted person. The utilization of cortisone and ACTH in the care and management of these patients should be individualized, according to the degree of disability, initial response, and subsequent course. It is possible under favorable circumstances to convert an invalid to one who can be gainfully occupied (cases 1, 4, and 5), and even to save the patient's life during an acute crisis such as laryngeal edema (cases 4 and 5).

### SUMMARY

Acute vascular purpura is not always an acute self-limited process. Chronic potentialities do exist and must receive adequate consideration in differential diagnosis. This is particularly true in those instances where the classical joint and skin manifestations are not striking in any single attack, and may be dissociated from gastro-intestinal complaints and from each other. It is only by careful consideration of all features presented by a series of separate attacks that the true diagnostic picture becomes evident. The apparently generally accepted concept that vascular purpura is an acute self-limited process should be abandoned inasmuch as a significant number of cases fall within a chronic disease pattern. This feature received adequate consideration in the original descriptions of the disease by Osler. However, in subsequent medical writings, while occasionally receiving mention, it has received insufficient emphasis.

Having made the diagnosis in this sometimes disease state, the physician is still confronted problem of management. Other than steroid therapy very little in the way of effective symp-



**Joints.** Joint manifestations while usually present may be minimal or absent. Some patients complain more bitterly of pain in the muscles rather than joints, particularly in the lower leg. The clinical spectrum of joint involvement is wide indeed. Only a single joint may be involved or there may be a migratory, extensive, polyarticular involvement. The intensity varies from slight arthralgia to severe, totally incapacitating pain with hot, swollen periarticular tissues and reddeed skin. The pain may last over a prolonged period with some waning of intensity at intervals, but with discomfort more or less constantly present. However, a relapsing course of variable severity for each attack constituted the more common pattern of the chronic type of this disease. For the most part, the joint manifestations accompany other features of the syndrome. However, joint symptoms may antedate the other manifestations or occur as an isolated feature during any single attack. Once again, careful history will assist in uncovering a fleeting erythema or purpura, an attack of nonitching urticaria-like lesions, or repeated episodes of abdominal pain or burning. Suspicion aroused sufficiently by an unexplained arthritis may lead to recognition of the correct diagnostic pattern, particularly in the more chronic cases which have a longer time in which to develop all the features of the syndrome.

**Renal.** Renal manifestations or complications in the form of glomerulonephritis occur in a substantial number of patients, and Philpott and Briggs<sup>8</sup> reported as high as 47.5 per cent in children. There may be either gross or microscopic hematuria with casts and proteinuria.

The kidney may show involvement at any time during the evolution of the syndrome, most commonly appearing as acute nephritis followed by apparent complete recovery. However, serial urinalyses over a prolonged period may reveal cyclic recurrences of abnormalities on urinalyses suggesting a continuing or intermittent pathologic process in the kidney (case 2). The outlook for this latter group may be no better than for those who have chronic progressive nephritis.

**Fever.** Fever is usually present but may not be a prominent feature during a prolonged course or during any single acute exacerbation. Temperature elevation to 104°F (case 5) is common. Some patients may have classical involvement of the joints and skin with little or no temperature elevation. As a general rule, however, fever tends to accompany exacerbations in the more severe chronic forms.

**Other Organs Involved.** Due to the angitic nature of the disease, other organs and systems may become involved. Laryngeal edema occurred in two of our patients (cases 5 and 6) and has been reported by others.<sup>11</sup> Three of our patients developed hyper-



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## Clinicopathologic Conference

U. S. Air Force Hospital, Lackland Air Force Base, Tex.\*

### HEADACHE, LOW BACK PAIN, AND DIPLOPIA

**Summary of Clinical History.** A 20-year-old white male airman entered the hospital for the first time on 23 September 1952, with the chief complaints of headache and decrease of vision for approximately two and one-half months. The patient was apparently perfectly well until about 4 July 1952, when he noted the insidious onset of headache, which started in the region of the orbits and very often involved the entire calvarium. These headaches came on at any time of the day and seemed to persist despite the usual analgesics. About a week later he noted also the insidious onset of low back pain with no definite radiation into the legs, which persisted until admission.

By about the end of July 1952, the patient started experiencing diplopia, worse on looking down and to the left. In early August 1952 he experienced several days of febrile illness vaguely described as "flu," associated with some general malaise, for which he was given streptomycin sulfate. This apparently cleared and he was able to return to duty. About three weeks prior to admission, he noted the beginning of progressive visual acuity difficulties such as blurring and indistinctness. At the time of admission, headaches were less severe and seemed to be associated with pain behind the eyes; he had a suboccipital sore but denied trauma, loss of consciousness

the results with steroid therapy may not always be satisfactory or predictable. This is particularly true of the renal complications. Nevertheless, steroid therapy does alter the manifestations of the disease favorably to a limited extent and may permit one to treat the patient during the most troublesome phases, perhaps to an extent consistent with continued gainful employment. If the basic concept of a diffuse process incident to a small blood vessel angiitis on an immunovascular basis is accepted, then one is immediately aware of the multiple organ involvement.<sup>13,14</sup>

The generally favorable modifying effect of the steroids adds support to the hyperimmune concept of this vascular disorder. Lecutier<sup>15</sup> has likened vascular purpura to periarteritis nodosa. Dameshek<sup>13</sup> reviewed the evidence favoring this concept and drew the analogy between this disorder, thrombotic thrombocytopenic purpura, and disseminated lupus erythematosus.

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Position sense was normal. Stereognosis was normal. No abnormal associated movements were noted. Reflexes were normal, except that the abdominal reflexes were 2 plus in both quadrants on the right and only 1 plus in both quadrants on the left. In the examination of the cranial nerves the olfactory sense was not tested but was described by the patient as satisfactory. Visual acuity seemed to be depressed; there were 2 to 3 diopters of papilledema in both eyes but no evidence of hemorrhage. On examination of the extra-ocular muscles, the patient complained of diplopia, and when the object presented was in the lower field of vision the image seen from the right eye was a good deal lower than that seen from the left. Corneal reflexes were intact. There was no evidence of motor deficit in the mastication muscles. The remainder of the cranial nerves were normal. Sensation to pin prick was normal. The patient's speech and mentation seemed to be adequate.

**Laboratory Studies.** Hemoglobin was 13 g/100 ml; the white blood cell count was 10,850/ $\mu$ l with 70 per cent neutrophils, 4 per cent polymorphonuclear leukocytes, and 26 per cent lymphocytes. Coagulation time was 3 minutes and 40 seconds. Urinalysis revealed a specific gravity of 1.020 and was negative for albumin and sugar; there was 0 to 1 white blood cell per high power field.

On electroencephalography an excellent technical tracing revealed a well-developed alpha activity in all areas at a frequency of 10½ cycles per second and reached an amplitude of 100 microvolts in the occipital areas. The bipolar records, both antero-posterior and transverse, showed no abnormal wave forms or frequencies. The monopolar linkages likewise showed no abnormality on the regular run. However, after 1½ minutes of hyperventilation, a marked breakdown in the pattern sets, characterized by long bursts of delta potentials at 2½ cycles per second in all leads, occurred. These reached a very high amplitude, sometimes as much as 400 microvolts. In some runs the characteristic "spike and dome" complexes were noted. This breakdown in the normal pattern persisted for some 25 minutes after the cessation of the overbreathing.

Visual fields revealed a slight, generalized constriction of questionable significance.

**Course in Hospital.** A ventriculogram was done on 26 September under local anesthesia and 45 ml of air injected. Filling was good except that no filling of the fourth ventricle occurred. There was no evidence of shift, and the slight deviation appeared to be symmetrical. The postoperative condition of the patient was good. Attempts at filling the posterior fossa from below were unsuccessful. On 28 September, the ventricle was tapped on the left side and fluid was released under great pressure. The patient

control problems, and other disabilities such as ringing in the ears, difficulty in swallowing, or unsteadiness of gait. His memory had been unimpaired.

The patient had been in military service for 17 months, and had always been in this country. Prior to entry into the service, he had been a student. The remainder of his past history was noncontributory.

**Physical Examination.** Physical examination revealed a well-developed, well-nourished, mentally clear white man in no acute distress. Blood pressure was 130/75 mm Hg; pulse, 78 per minute; end temperature, 98.6°F.

Examination of the head revealed no skull deformity and no audible bruits. The neck was supple, with trachea in the midline, with no tracheal tug, and the thyroid was not palpable. Carotid pulses were strong and equal.

Examination of the eyes revealed the left palpebral fissure to be slightly larger than the right so that more of the sclera on the left was visible. Conjunctivae and sclerae were clear. The extra-ocular muscles showed no objective change; however, the patient claimed that there was diplopia on looking down, and especially to the left. Visual fields were grossly normal. The ears, nose, throat, and mouth were not remarkable.

The lungs were clear to percussion and auscultation. The heart was not enlarged and had a regular sinus rhythm. The aortic second sound was louder than the pulmonic second sound, and there seemed to be a split first sound at the aortic area; however, no murmurs or friction rubs were heard.

Examination of the abdomen revealed no tenderness or hernias, and the genitalia were normal. On rectal examination, sphincter tone was good, and no masses or blood were noted. The prostate was normal.

On examining the back, no limitations of motion were noted; however, there was a peculiar deformity in the upper lumbar or lower thoracic area, which seemed to be asymmetrical on flexion with a concavity appearing on the left of the spine and a convexity appearing on the right. No pain in the back resulted on straight leg raising. There was no cyanosis or edema of extremities. Both femoral and popliteal pulses were felt, but neither the dorsalis pedis nor posterior tibial pulses were felt.

Neurologic examination showed the patient to be right-handed. His gait was normal, but on testing muscle strength, there was weakness of the plantar flexors on the left with no evidence of rigidity, atrophy, or muscle tenderness. Muscle strength and volume tone were normal elsewhere. Co-ordination was good.

a transient episode with "flulike" symptoms occurring during the first month of illness. Except for a few days he was well enough to continue his regular duty. Three weeks prior to hospitalization he noted progressive blurring and indistinctness of vision followed by diminution in severity of headache and associated with pain behind the eyes and suboccipital soreness. Physical examination was remarkable for its normalcy. A thoracolumbar scoliosis and absent distal lower extremity pulses were reported. Neurologic examination showed bilateral papilledema and diplopia most marked on looking down and to the left. An inequality of the palpebral fissures was also noted. The headache in this case was nonspecific in type. Its onset was insidious, periorbital, and often generalized. We do not have the details as to its intermittency or relationship to activity or time of day, but we are told that they were less severe by the time he was hospitalized. At that time they were associated with pain behind the eyes and suboccipital soreness.

The general features of this headache are those seen in many systemic illnesses as well as in many nonfocal disorders of the nervous system and therefore do not contribute much to the localization of an intracranial process in this patient. In any neurologic condition the initial location of head pain or headache is of interest to us because it may prove a factor in lateralization. This usually is the case only in the early stages before the headache becomes generalized, or before increased intracranial pressure itself obliterates the localizing features. In this case the periorbital pain is quite nonspecific. Not only can any intracranial process above the tentorium produce this type of pain, but so can increased intracranial pressure alone as well as entirely nonspecific toxic tension factors.

A week after the onset of this low grade headache, the patient experienced insidious onset of low back pain. We are not told whether any particular stress such as activity, coughing, or posture affected this pain. However, we learn later that there was a deformity in the thoracolumbar area, resulting in scoliosis on flexion of the spine. There were no local signs nor evidence of nerve root compression on examination. The bony deformity was most likely unrelated, but the backache could either be related in a nonspecific way or represent a mild meningitic reaction, possibly to blood, infection, or neoplasia.

The next feature to be considered is the early onset of diplopia. This began approximately two weeks after the onset of the headache and preceded by a week the onset of the febrile illness in early August. From the onset, it was a fairly specific type, that is, worse on looking down and to the left. This was the same picture that presented nearly two months later at the time of his admission. However, by the time of admission the patient had another complaint, that of progressive visual acuity difficulties, with blurring and indistinctness of vision. However, as it is reported in the clinical summary one has the impression that this is a separate phenomenon. We would like to know,



complained of his eyesight becoming progressively worse, but his general condition remained good. On 29 September, a Torkildsen procedure was done. During the course of induction the left lateral ventricle was punctured because of the patient's rather shallow respirations. Neither lateral ventricle could be located with a ventricular needle, after a few minutes. A right occipital flap was turned down and the right occipital lobe was removed in order to see into the ventricle. The right lateral ventricle was entirely filled with clotted blood; when this was removed it could be seen that the third ventricle was also filled with a blood clot. No further procedure was carried out and the wound was closed.

After return to the ward, the patient suddenly had a high elevation of blood pressure (200/120 mm Hg) and pulse rate (240 per minute). A ventricular tap was done, revealing grossly bloody fluid under great pressure. Attempts at introduction of a polyethylene and a No. 10 French catheter into the left lateral ventricle were unsuccessful. An endotracheal tube was re-inserted and respirator applied. Blood pressure dropped to 90/65 mm Hg, and pulse remained high at 200 per minute, the patient still breathing spontaneously at 1 to 2 per minute. At 1930 hours that same day there was no further change in his condition except that blood pressure varied from 210/100 to 80/40 mm Hg. Neosynephrine (brand of phonyllepfrine hydrochloride) was given by continuous intravenous drip. The heart was not enlarged on physical examination and heart sounds were of good quality, but the rate was 140 per minute with regular rhythm. The patient was then prophylactically digitalized with digitoxin intravenously, because of a pulse rate varying between 120 and 240 per minute for the previous 5 to 6 hours. At 2115 hours, 4 ml of Cedilanid (brand of lanatoside C) intravenously and 50 mg of Neosynephrine by continuous drip were given.

By 2330 hours, the blood pressure had stabilized at 90/70 mm Hg, and the pulse dropped to 150 per minute. The patient, however, looked worse clinically; the pupils were widely dilated and did not react to light, the patient being in a deep coma. Heart sounds were not of good quality, but still no signs of cardiac failure had appeared. Four milliliters of Cedilanid were then administered. By 1700 hours, on 30 September, all reflexes, as well as neurologic function had disappeared. On 1 October, at 0600 hours, the patient was pronounced dead.

#### DISCUSSION

Doctor Baker:\* The essential features of this 20-year-old airman's history were the insidious onset of orbital and generalized headache 12 weeks prior to hospitalization, with low back pain, diplopia, and

\*Capt. Robert N. Baker, USAF (MC), Neurology Service.

a transient episode with "flulike" symptoms occurring during the first month of illness. Except for a few days he was well enough to continue his regular duty. Three weeks prior to hospitalization he noted progressive blurring and indistinctness of vision followed by diminution in severity of headache and associated with pain behind the eyes and suboccipital soreness. Physical examination was remarkable for its normalcy. A thoracolumbar scoliosis and absent distal lower extremity pulses were reported. Neurologic examination showed bilateral papilledema and diplopia most marked on looking down and to the left. An inequality of the palpebral fissures was also noted. The headache in this case was nonspecific in type. Its onset was insidious, periorbital, and often generalized. We do not have the details as to its intermittency or relationship to activity or time of day, but we are told that they were less severe by the time he was hospitalized. At that time they were associated with pain behind the eyes and suboccipital soreness.

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The next feature to be considered is the early onset of diplopia. This began approximately two weeks after the onset of the headache and preceded by a week the onset of the febrile illness in early August. From the onset, it was a fairly specific type, that is, worse on looking down and to the left. This was the same picture that presented nearly two months later at the time of his admission. However, by the time of admission the patient had another complaint, that of progressive visual acuity difficulties, with blurring and indistinctness of vision. However, as it is reported in the clinical summary one has the impression that this is a separate phenomenon. We would like to know

however, whether the blurring occurred in both eyes, and if the patient thought it was a different affair from his diplopia. I mention this because in many cases a patient who states that he has blurred vision is actually experiencing this on the basis of extra-ocular muscle imbalance or paresis, and it is not due to interference with the visual pathways. In this instance, however, it seems safe to assume that this is a separate complaint related to the papilledema. The statement that the extra-ocular muscles showed no objective change probably indicates that there is no observable strabismus to simple direct inspection. With the distinct diplopia on looking down and to the left it seems likely that with the use of a light and colored lens, one could have objectively demonstrated this disorder. A detailed extra-ocular muscle analysis would have been very helpful.

It was also stated: "Examination of the eyes revealed the left palpebral fissure to be slightly larger than the right so that more of the sclera on the left was visible." This may mean that the abnormal fissure is on the right and that there is ptosis of the right lid due either to a third nerve, levator palpebrae weakness, or to interruption of sympathetic fibers on that side with loss of tone of orbicularis oculi muscles. Or it may mean that the abnormal fissure is on the left with widening consistent with a partial seventh nerve paralysis on the left. Since there was no description of difficulty in closing the eye or other left facial weakness, this latter possibility seems quite unlikely. We should also mention the possibility of mechanical distortion by something in the retro-orbital region pushing the globe forward. No description of exophthalmos is included, however. In any analysis of unequal palpebral fissures, one of the most important observations is the state of the pupils. If the right ptosis is associated with a dilated pupil the lesion would clearly be that of a third nerve parasympathetic paralysis. On the other hand, if the ptosis was associated with a small pupil one would think that a sympathetic palsy on the right would be more likely. Do we have a report on the pupils?

Doctor Strong:\* The first time the pupils were mentioned was post-operatively.

Doctor Baker: That observation of course would be very valuable in our analysis, but we will have to do without it. Let us return to the diplopia. Whenever the patient claims there is diplopia only on looking down and especially on looking to one side, there is a good likelihood that the disturbance is in the fourth or trochlear nerve. In such lesions the diplopia is maximum when the involved eye is rotated medially. In this instance this would fit a superior oblique paralysis on the right side. The only alternative would be that of partial third nerve palsy or a combination of palsies. In most instances, however, third nerve lesions produce more complex extra-ocular imbalances. It would be quite rare to find one that simulated a trochlear lesion alone; on the other hand, the right-sided ptosis suggests a third nerve lesion

\*Capt. Jack P. Strong, USAF (MC), Pathologist.

on the right also. I do not believe we can settle this matter finally. The presence of diplopia, however, does tell us that there is a lesion either involving the peripheral extra-ocular nerves or intrinsic to the midbrain itself. Occasionally something involving the muscles themselves may simulate a neural lesion. This is uncommon and does not fit here. The extra-ocular muscle findings do tell us that the disturbance is at the base of the brain, and very likely at the level of the midbrain or at the incisura tentorii. As noted before, the evidence suggests that the lesion is more likely to be on the right than on the left.

Turning to the impairment of visual acuity this would seem to fit quite well with the findings of papilledema. The slight constriction of the visual fields is also consistent with papilledema. The fact that papilledema seemed symmetrical in the two eyes does not exclude a lateralizing lesion but is consistent with intracranial pressure of any type, including an expanding lesion at the base or in the posterior fossa. The characteristics of the headache are consistent with those seen in increased intracranial pressure.

Most significant in this case is the absence of any other striking neurologic abnormalities. There is nothing in the examination to suggest a focal cerebral lesion. The statement that plantar flexion on the left was weak probably refers to a difference in the response of the great toe to plantar stimulation; that is, to a nascent Babinski sign on the left. The presence of a left Babinski would fit quite well with a right midbrain lesion. The only reflex abnormality was the abdominal reflexes which were diminished on the left. This also would go with the possible left Babinski and right extra-ocular muscle signs. The cardiac murmur and absent dorsalis pedis pulse do not seem related to his central nervous system disorder.

The laboratory data are not helpful. A spinal was not done, undoubtedly because of the evidence of increased intracranial pressure. In a problematic case such as this I would have done a spinal with removal of only a small amount of fluid. The electroencephalogram is of interest: During hyperventilation, symmetrical bursts of  $2\frac{1}{2}$  cycles per second waves reaching an amplitude of as much as 400 microvolts were seen. In some runs these appeared as "spike and dome" complexes. This is a significantly abnormal response and is suggestive of a deep lesion. But there is no electroencephalographic evidence of laterality. It is consistent with a disturbance at the base of the brain.

We have a gradually progressive central nervous system disorder with headache, extra-ocular muscle abnormalities, and papilledema. In addition there was a brief febrile episode and mild backache. Although an infectious disease cannot be entirely excluded in this case, it seems much less likely than an expanding intracranial lesion. Such an expanding lesion, either intra- or extra-medullary—in the region of the posterior third ventricle, around the tentorial incisura or in the

posterior fossa with pressure in the region of the midbrain—seems most likely. Among the expanding lesions we must consider neoplasia, vascular anomalies, and foci of infection. This may be a rare glioma of the midbrain. It could be an ependymoma of the fourth ventricle with midbrain pressure and possibly seeding to the site of the spinal pain. An astrocytoma of the cerebellum may show itself only by pressure signs. In this case there could be early infiltration into the midbrain.

To mention the infectious possibilities: First would come a granulomatous meningitis with occlusion of the foramina of Luschka and consequent internal hydrocephalus. Occlusion of penetrating vessels at the base might account for focal midbrain signs, et ceteta. Another rare possibility would be a focal granuloma or abscess acting as an expanding lesion. In this group a tuberculoma or a fungus granuloma should be mentioned. My first choice, however, will be a vascular anomaly such as an arteriovenous malformation at the level of the tentorial incisura. Such a lesion could act first as an expanding mass, secondly account for the headaches and backache, and possibly contribute toward the febrile episode. It would most readily account for the confusing sequence of events which followed the patient's hospitalization and led to his death. A vascular meningioma would fit the picture also. My diagnosis will be: first, vascular tumor, and second, possible midbrain or cerebellar glioma. Its location would be at the level of the midbrain or the incisura tentorii and most likely more on the right side.

Let us now turn to the course in the hospital. A ventriculogram was done on 26 September under local anesthesia and 45 ml of air injected, which is slightly more than average. What do you think, Doctor Mendelsohn?

Doctor Mendelsohn: You don't want to know how much air was injected, you want to know how much fluid you got out. You have an open system and if you inject 100 ml with a capacity of only 20, it goes in one side and comes out the other. It would be much more helpful to know how much fluid was drained. Here it was probably the same. The normal volume of fluid in the ventricles is from 20 to 30 ml.

Doctor Baker: Filling was good except that no filling of the fourth ventricle occurred. In other words, they apparently filled the third ventricle adequately. Of course, it is very difficult sometimes to fill the fourth ventricle. It doesn't prove that the trouble was back in the fourth ventricle, although it is more likely since the ventricles were all right. There was slight dilation of the lateral ventricles which appears to be symmetrical. The postoperative condition of the patient was good. Attempts to fill the posterior fossa from below were unsuccessful and this is probably of significance, although sometimes it is hard to do. On 28 September, the ventricle was tapped on the left side and fluid

\*Maj. Robert A. Mendelsohn, USAF (MC), Chief, Neurosurgery Service.

was "released under great pressure." I assume that this meant that the fluid appeared normal and not tinged with blood. Subsequently the patient complained of his eyesight becoming progressively worse, but his general condition remained good. On 29 September a Torkildsen procedure was done.

Doctor Strong, can you tell us whether or not there was a lapse of time between the Torkildsen procedure and the exploratory craniotomy?

Doctor Strong: Apparently the Torkildsen was accomplished, but subsequently the patient did not do well and he was again taken to surgery.

Doctor Baker: It seems, then, that the first ventricular puncture on the 29th was normal, but that during the second one they couldn't locate the ventricle. A right occipital flap was turned down and the right occipital lobe was removed in order to see into the ventricle. The right lateral ventricle was entirely filled with "clotted blood." When this was removed it could be seen that the third ventricle was also filled with a blood clot. No further procedure was carried out, and the wound was closed. In trying to decipher just what happened, I would say that something apparently happened between the successful ventricular tap and the time they opened the ventricle and found the clotted blood. In the light of these events I wonder if this was not a primary vascular lesion of some sort around the incisura tentorii, that the disturbance of intracranial dynamics at operation resulted in hemorrhage, and that this was not just a consequence of operation but due to the primary pathologic process? I really feel that the significant lesion is in the posterior fossa and that it may very likely be vascular.

Another possibility is an aneurysm, acting as an expanding mass or a tumor, that did not rupture until the time of this surgical procedure. It could have acted as a tumor, expanding and obstructing at the level of the midbrain. Does anyone have any questions or comments?

Doctor Mendelsohn: The report on the ventriculograms was that there was "no evidence of shift, and a slight dilatation that appeared to be symmetrical." Here I think the weight of evidence would be on the findings at ventriculography as to whether there was increased pressure or increased fluid to account for the increased intracranial pressure. You occasionally see tumors in the posterior fossa that don't give evidence of obvious neurologic findings, sometimes, until a patient begins to deteriorate. It's possible to tie in the findings down in the spine, the weakness of the flexors of the foot, the scoliosis, et cetera. In some tumors of the posterior fossa you get seeding of the tumor down the sac and in the meninges, and you can have implants from almost any of the gliomas that could arise in the posterior fossa and seed down there. Likewise, although it would be stretching it, you could tie in the low back findings with bleeding intracranially. Often patients who have subarachnoid hemorrhage complain first, or early in their course, of low back pain, presumably from the blood settling down in the cul-de-sac and irritating the nerve roots. As far as making

a guess, I would say this was a posterior fossa tumor rather than vascular lesion, just on the basis of percentages.

**Physician:** What would you make of the poor filling of the fourth ventricle?

**Doctor Mendelsohn:** The lateral ventricles were well filled. As Doctor Baker mentioned, very often for technical reasons you don't fill the fourth ventricle, aqueduct, and even the third ventricle. Where you have clinical evidence that there could be a lesion there, it may be significant. This is especially true when you try to fill it from below and don't. If you don't find evidence of a lesion, you just have to depend on your clinical picture. If there is no reason to expect a lesion there, you just assume it is a technical difficulty. If there is an obstruction at that point, then he should have hydrocephalus. He should have big ventricles. Undoubtedly the surgeon felt that there was hydrocephalus in this case—i. e., that there was increased pressure in the ventricles—otherwise he would not have done a Torkildsen. Presumably he felt there was an obstruction in the ventricular system.

There is one other thing that wasn't mentioned. It is possible for systemic illnesses to cause these same findings. Collagen disease could give the whole picture as far as intracranial and central nervous system findings are concerned.

**Doctor Baker:** In general, though, one would expect more findings, either systemic or indicating diffuse involvement of the central nervous system. I don't believe it would explain our patient's difficulty.

**Doctor Eisenberg:**\* Couldn't the findings in this case be accounted for by some infectious process such as tuberculous meningitis or a fungus infection?

**Doctor Baker:** Yes, that is a possibility. We would like very much to have seen a spinal fluid examination and a better general medical evaluation, too.

**Dr. Baker's diagnoses:**

1. Vascular anomaly or neoplasm at level of midbrain or tentorial incisura, most likely on right side
2. Possible midbrain or cerebellar glioma

**Dr. Mendelsohn's diagnosis:**

1. Posterior fossa tumor

**PATHOLOGIC FINDINGS**

**Doctor Strong:** The last question from the floor was a very pertinent one. The major findings at autopsy were confined to the central nervous system, although there was slight bronchitis and early bronchopneumonia. The brain weighed 1,600 grams, was soft, and held its shape poorly. In the right occipital region the tissue was soft, hemor-

\*First Lt. Eugene Eisenberg, USAF (MC), Medical Service.

rhagic, and fragmented. In the left occipital region, a 2-cm defect containing fragmented brain tissue was noted. The area of the hemorrhage noted in the right occipital region extended into the posterior portion of the corpus callosum. Over the convexity of the brain, the sulci showed signs of increased pressure, with swelling and flattening. The vessels were congested. Around the base of the brain there was subarachnoid hemorrhage and softening. Multiple sections through the cerebrum showed the blood in both lateral ventricles and in the third ventricle that had been noted at operation. There was more blood on the right side than on the left. Sections through the mesencephalon showed the aqueduct to be occluded. A fairly large area of hemorrhage was present in the brain stem beneath the aqueduct. Sections from the most cephalic portion of the pons disclosed a normal fourth ventricle. The medulla and cerebellum were not remarkable.

Microscopic examination of sections from the mesencephalon at the level of the inferior and superior colliculus and at the level of the internal capsule showed subarachnoid hemorrhage with necrotic cellular debris present. Among this debris were organisms morphologically identical with *Cryptococcus neoformans* (figs. 1 and 2). These organisms were bluish in color and round to ovoid in shape. There was some suggestion of budding. The organisms had the typical thick capsule

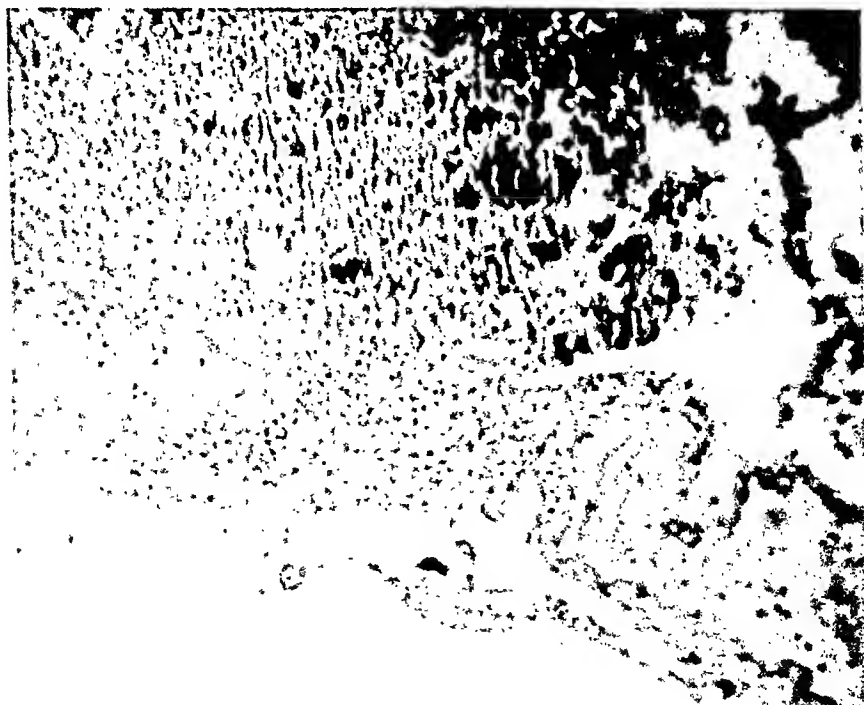


Figure 1. Section showing degeneration and chronic inflammation of brain tissue with *Cryptococcus neoformans* organisms in the area of degeneration. (×100)



and ranged in size from 5 to 15 micra in diameter. Also a section from the cerebellar-pontine angle showed organisms both on the surface of the brain and within the brain, being more prominent on the surface.

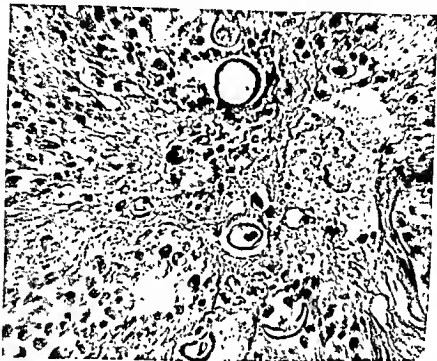


Figure 2. *Cryptococcus neoformans* organisms (under high power) in areas of degeneration of brain tissue, ( $\times 400$ )

There were no actual gross cysts noted on sectioning but with these findings the diagnosis of cryptococcosis could be made.

**Pathologic diagnoses:**

1. *Cryptococcus neoformans* meningoencephalitis with obstruction of ventricular system of brain in vicinity of aqueduct of Sylvius
2. Bronchopneumonia, early
3. Focal atelectasis of lung

Doctor Strong: Cryptococcosis is a subacute or chronic infection, caused by a yeast correctly named *C. neoformans* and also known as *Torula histolytica*, which may involve various portions of the body but which has particular predilection for the brain and meninges. According to Ratcliffe and Cook,<sup>1</sup> it has been called European blastomycosis and was first described in Germany by Zenker in 1861. The great majority of cases, however, have occurred in the United States, with only 30 cases recorded from the European continent, so that the term European blastomycosis is a misnomer.<sup>2</sup> This organism has been

found in fruit juices, on the surface of peaches, on plants, in insects,<sup>3</sup> and in the human throat, gastro-intestinal tract, and skin. It has been found in some infections in horses and other animals. There has been no evidence that man has contracted the disease from an infected animal or that the disease is transmitted from man to man. Cryptococci from severe infections are differentiated from those from the above sources only by pathogenicity in animals. This organism grows rather slowly in man, showing that man probably is not a suitable host for the organism.

Cryptococcus grows at room temperature or at 37°C. It forms a moist, slimy growth which is white for the first several days; at the end of approximately one week it begins to turn tan, brown, or orange in color.<sup>3</sup> The organisms are ovoid to round, yeastlike in appearance, and produce single buds. The organisms have thick capsules which are shown best by examining exudate or culture material with dilute India ink. The cryptococci may be differentiated from other budding fungi such as blastomyces by the formation of single buds, their wide capsule, and their failure to produce mycelia on culturing at room temperature.

Clinically, the infection may remain localized or may clear up entirely. If it does continue to spread, it usually spreads by way of the lymphatics and blood stream to various tissues and organs and almost invariably terminates in the central nervous system. When meningitis develops, the course is more rapid and nearly always fatal. In the central nervous system cryptococcosis usually appears gradually, as in this case. Often there are intermittent frontal headaches which later become more severe and continuous. Occasionally the onset is sudden. Dizziness, vertigo, and pain in the back of the neck are common symptoms. As the disease progresses, evidence of severe mental disturbances may occur.<sup>4</sup>

The physical signs are the same as those of any chronic meningitis, with stiffness of neck and positive Kernig and Brudzinski signs. Amblyopia is common and strabismus, nystagmus, ptosis, diplopia, ataxia, and hemiplegia are noted occasionally. Papilledema is frequently present. In spite of the severity of the symptoms, the patients usually do not present the picture of acute infection. There is usually a low-grade fever, slight leukocytosis and relative lymphocytosis, normal blood pressure, and normal or slightly increased pulse rate. As the disease progresses there is marked loss of weight and strength, and the patient ultimately becomes comatose and dies of respiratory failure. Clinically, some of the conditions that cryptococcosis of the central nervous system may simulate are encephalitis, paresis, tuberculous meningitis, brain abscess, subarachnoid hemorrhage, subdural hemorrhage,<sup>5</sup> virus meningitis, pyogenic meningitis, brain tumor, or spinal cord tumor.<sup>6</sup>

Diffuse cryptococcosis, without specific granulomata as we see in this case, can produce the picture of an expanding intracranial lesion and may occasionally do so with a negative spinal fluid. Of

220 patients with cryptococcosis reviewed, 178 had central nervous system involvement; 42 (23 per cent) of these 178 were suspected of having an expanding intracranial or intraspinal lesion and an operation was performed.<sup>1</sup> So the present case is not particularly unusual in that respect. Usually the course of the disease is from one to six months, although there have been cases in which the patient died within several weeks<sup>7</sup> and some in which the patient lived over seven years after the onset. The meninges and the brain may appear practically normal. The organism may be scattered so evenly in the subarachnoid space that cloudiness is scarcely perceptible. The cut surface of the brain may be normal, or there may be tumorlike masses of organisms with apparent cyst formation. In the meninges the organisms are usually abundant in the exudate. In the brain they may occur in the gray matter or basal ganglia and frequently form cystlike areas due to accumulation and coalescence of capsular material.<sup>4</sup> Epithelioid and giant cells, similar to those seen in tuberculosis at times are numerous in the lesions. Other organs or tissues less frequently involved are skin, subcutaneous tissues, lungs, kidneys, liver, spleen, adrenals, and pancreas.

If cryptococcosis and other fungus diseases of the central nervous system are considered in the differential diagnosis both of meningitis and of suspected expanding intracranial lesions, the diagnosis will be made more often during life.<sup>2</sup> The disease may be suspected if there is an unexplained pleocytosis or reduced cerebrospinal fluid sugar, or if there are systemic lesions in presence of neurologic signs and symptoms of undetermined cause. In suspected cases, spinal fluid should be cultured for fungi. Cultures should be incubated for at least one month.<sup>7</sup> One negative culture doesn't exclude the disease. The spinal fluid should be carefully examined using a dilute India ink preparation.

The treatment for this disease is unsatisfactory. Iodides and sulfa drugs have been used with questionable success. It seems likely that the usual progressive course to a fatal termination is best explained by poor antibody response, the protective effect of abundant capsular material, and the inefficient phagocytic reaction of the host's cells.

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# MEDICAL PRACTICE WITH THE MARINES ON OCCUPATION DUTY IN KOREA

JAMES B. SHULER, *Captain, MC, USN*

**T**HE NEED for effective medical and surgical support for a combat operation will not be questioned. Few, however, aside from the military personnel actually involved, appreciate the problems of an intact medical section as part of a combat-ready occupation force that may, at any time, be called upon to face renewed hostilities.

With the cessation of actual fighting in Korea in the summer of 1953, the 1st Marine Division, FMF, occupied a frontage on the main line of resistance and was thus obliged to maintain a high order of combat readiness. Historically, this sector was astride one of the main tactical avenues of approach to Seoul from the North. While such an assignment offers excellent training opportunities for the combat units of a division, it could present difficulties in keeping the medical section busy, efficient, and combat-ready professionally.

Surgical and medical skills cannot long remain relatively idle without deterioration. Likewise, hospital corpsmen, ranging from highly trained technicians to junior aid station men, cannot be kept fruitfully busy and professionally fit by simulated situations and combat-training operations alone. The usual medical and surgical conditions met in day-to-day outpatient sick call and inpatient practice, including the ever-present traumatic cases, are not sufficient to keep an adequately staffed medical battalion up to its desired professional capabilities, or to allow for a progressive medical and surgical training program for the medical officers and corpsmen.

### NEED FOR MEDICAL AID

The 1st Marine Division's sector of Korea was almost unbelievably devastated from both a social and economic viewpoint. Towns, farms, homes, schools, and people suffered from the horrible destruction and dislocation of war.

As our national policy was orientated toward the rebuilding of Korea, the military forces on the spot were in a position to implement this aim in the place where it was desperately needed.

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From 1st Marine Division, Fleet Marine Force, San Francisco, Calif. Capt. Shuler is now assigned to U. S. Naval Hospital, Corpus Christi, Tex.

The Armed Forces Assistance to Korea Program (AFAK), under the Commanding General, Eighth United States Army, provided funds for rehabilitation projects such as schools, hospitals, aid stations, and local industries, to mention a few important ones in the 1st Marine Division's sector.

For example, under the AFAK program, funds were supplied to purchase the actual building materials for a community hospital. The First Engineer Battalion, as the Division unit sponsor, supplied scientific know-how and supervision in the actual construction of the hospital, which covered the period from the initial plans to the completed structure and official dedication. The local Korean community provided the actual labor for the building phase and the hospital site. The First Medical Battalion acted as professional advisor both for the design of the hospital and for its medical staffing and technical outfitting.

A second higher-level agency concerned with medical rehabilitation and other functions, including public health, was the Korean Civil Assistance Command (KCAC). This organization provided the fitting out of medical and surgical equipment and supplies for the local hospital. It paid the salaries of the local Korean doctors, nurses, and attendants until the hospital was formally transferred to the Ministry of Health. In addition, KCAC supplied the basic Korean ration for the hospital patients. Since this community hospital was in a front line sector and was supervised by the sponsoring First Marine Division units, its growing pains were keenly felt by them (fig. 1).

While the hospital was being constructed, and this took many months, the civilian sick and injured were cared for in a group of temporary buildings adjoining the hospital site. The staff of the hospital consisted of a male and female physician, a dentist, nurses, and attendants—all Koreans.

The Navy medical group, as well as the military in general, were amazed and startled by their first look at medical practice in a native community in which there was so much to do and so little to do it with. Roentgenographic equipment, autoclaves, sterilizers, laboratory facilities, and antibiotics were initially unavailable but not unknown or unappreciated by the local civilian Korean doctors or their patients. With the institution of the AFAK and KCAC programs, the medical supply problem was greatly improved but professional supervision could only be provided by personnel who had something to give and enjoyed giving their services.

#### MEDICAL PROBLEMS

Many medical officers became enthusiastically interested in local medical and surgical problems. It seemed to take the local populace and local physicians an even shorter time to appreciate

what the Navy doctors had to offer, and there was a huge consultative practice available from the local hospital to the 1st Medical Battalion Headquarters, which was several miles away.



*Figure 1. Dedication of Kumchon Community Hospital attended by representatives of the Korean Ministry of Health. The 1st Marine Division Band is in the foreground. Part of the city of Kumchon is seen in the background.*

From a public health standpoint, the major medical problem in South Korea was tuberculosis. The extent and degree of tuberculous infection was such that stringent protective measures had to be taken by those of our personnel who saw Korean patients. It did not take long for the skeptic to become convinced that a roentgenogram of the chest was mandatory before any elective operative procedure, no matter how urgent, was undertaken.

Malaria, which was widespread, presented no problem because the military took suppressive therapy during the malarial season. Infestation with intestinal parasites approached the 100 per cent rate among the Koraans.

South Korea, like other parts of the world, suffered its share of the so-called venereal diseases, and gonorrhea was ever present. Syphilis was, to all practical purposes, nonexistent in the 1st Marine Division's sector. We did not diagnose a single case, either by dark field or by serologic means, that was thought to have originated in Korea. Of many hundreds of Kahn tests of civilians performed in the 1st Medical Battalion laboratory, not one was positive. The clinical diagnosis of chancroid could be made fairly often, but laboratory facilities were not available

for confirmation. Some students of this problem in the Far East cast doubt on the actual existence of chancroid in that area.

The local Korean doctors stated they rarely saw cases of hypertensive vascular disease. Toxemias of pregnancy were recognized, but patients so diagnosed by the community hospital doctors were said to have a bad outlook. The general state of nutrition among the natives was excellent, and primary dietary deficiency states apparently were seldom encountered. Pulmonary disease due to *Paragonimus westermani* was frequently diagnosed clinically by the Korean doctors, but, since microscopes and roentgenographic equipment were not at hand, the apparently satisfactory response to treatment (emetine) and the progress of the case differentiated the hemoptysis due to this infection from that due to tuberculosis. One case of pulmonary paragonimiasis in an American military man was diagnosed by finding the ova in the sputum.

The medical problems in Korea were so enormous and of such long-range import that our practice in the civilian population was of necessity limited to the more or less acute medical and surgical conditions, with the exception of corrective and therapeutic procedures in selected cases of chronic diseases and injuries.

For those interested in tuberculosis control measures, however, the tuberculosis control section of the Korean Ministry of Health planned a progressive and widespread program against the disease which will involve the use of large-scale chest photofluorograms, mass tuberculin skin testing of children, BCG vaccine, and current antituberculosis drugs. Most of this latter would of necessity be on an outpatient basis until tuberculosis hospitals can be erected and staffed. It is probable that a part of the facilities of the community hospital in the 1st Marine Division's sector will be used as a sectional photofluorographic, laboratory, and treatment center. This ambitious program, if technical personnel and equipment are obtained, will probably represent one of the most extensive and potentially productive antituberculosis campaigns ever instituted anywhere.

In a similar fashion, opportunities were abundant to get a first-hand look at the tremendously successful infectious and communicable disease control programs of the medical and public health sections of KCAC.

#### TREATMENT PLAN

With the cessation of hostilities and the local stabilization of the 1st Marine Division units in permanent camp sites, it was not long before the native populace in large numbers were presenting themselves for treatment (fig. 2). In a land where a



physician is a luxury, a Navy doctor with his pain-relieving drugs, equipment, and antibiotics is indeed a wonder. The four operating medical companies of the 1st Medical Battalion, each of which in effect was a small hospital, were, with the exception of medical schools and mission hospitals in the big cities, unique in South Korea. There were few patients indeed in the 1st Marine Division's sector who could ever hope to visit a hospital in a city days away by ox cart or on foot. Thus, in response to obvious need, the medical companies and unit sick bays began taking care of patients whom they were equipped to treat.



*Figure 2. Mother and baby who came to one of the more permanent battalion medical installations.*

The actual housekeeping procedures incident to the care of inpatients and outpatients presented no special problem. A tent was erected for sick call and to house the patients. Separate outside toilet facilities were set up, the food was provided by KCAC, and the relatives or friends of the patients prepared the Korean ration on Korean stoves and served it. There was never any lack of relatives to do this work, and it was usual for several members of the family to come and stay with the patient. Major operations were done in the medical company operating room.

The 1st Republic of Korea Marine Brigade, later the 1st Republic of Korea Marine Division, was a part of the occupation force in the 1st Marine Division's sector, and there was a United States Marine Advisory Group assigned to the Brigade. A medical officer was a permanent member of this group. A program was instituted by which Korean Navy medical officers and hospital corpsmen were assigned to the 1st Medical Battalion for professional training. One of the principal requirements in selection was the ability to understand English. These medical officers and corpsmen were most anxious to learn, and, where the language barrier did not interfere, they proved to be excellent students. The Korean doctors and corpsmen were given didactic and practical training in operating room technic, laboratory procedures, and patient care. The corpsmen acted as interpreters and ward corpsmen on the Korean civilian wards. The Korean Navy medical officers took care of the civilian Korean patients under supervision and assisted with them in the operating room. The Korean Navy medical officers came to the 1st Medical Battalion on a rotation basis and stayed for three months, then were rotated back to their Marine units and replaced by others.

This program proved to be of great value to both the 1st Marine Division and the 1st Korean Marine Brigade, because it gave our medical people valuable experience in instructing a fighting partner in areas in which we were competent and it gave the Korean medical group a close look at modern American military medicine. At the administrative level, the American Navy doctors could appreciate the various problems and advise their Korean colleagues in matters of organization, supply, and procurement.

### SURGICAL PROBLEMS

The orthopedic surgeons had a large experience in the treatment of patients with bone and joint tuberculosis, which was quite prevalent. Previously, these patients had been treated by the so-called "Chinese needle treatment," poultices of various kinds, and incision and open drainage of tuberculous abscesses. Many were rendered completely helpless by bizarre contractures. The patients came to the medical companies by ox cart, A-frame, or astride the back of a relative.

Those patients who would be most likely to respond to surgical treatment were selected. Initially, they were treated on an outpatient basis with streptomycin sulfate, para-aminosalicylic acid, and plaster immobilization. Operations were performed when they were deemed opportune, and the patients were again placed in an outpatient status, usually within two weeks. Follow-ups were necessarily limited, but in general the orthopedist thought the rate of fusion was about the same as in patients in United States hospitals.

Traumatic conditions were also very prevalent, many resulting from wounds suffered during the fighting, others from stray grenades and mines, still others from the increasing vehicular traffic. An interesting observation by an orthopedist was that in a nine-month period he saw no persons with congenital club foot or hip dysplasia.

In the field of reconstructive and plastic surgery (fig. 3), there were numbers and types of cases to stagger the imagination. A plastic surgeon remarked to the effect that South Korea was the scene of the ultimate in scar contracture. A raw neck, for example, caused the chin to be glued in a scar to the chest; the



*Figure 3. Open-air follow-up examinations in the plastic surgery clinic. In-patient ward tent is in background. Medical officer, corpsman, and interpreter are in left foreground. (Photograph courtesy of Lieutenant D. R. Millard, MC, USNR.)*

same process dragged eyelids off the eyes and drew legs up against the thighs. The congenital anomalies of harelip and cleft palate were abundant, but since the native population had not known of the existence of corrective measures, the children would not be brought in. However, once a case had been repaired, it was usual to have others brought in from the same village. As an example, after one particularly successful repair of a harelip and cleft palate in a very young infant who was slowly starving because of inability to swallow, a local papa-san brought three more children with harelip to the medical company on an A-frame.

These procedures were perhaps the most dramatic and impressive long-range results that the Navy medical group performed.

By such means, hopeless cripples were restored to normal activity in their own villages and will stand as tangible evidence of American good will in South Korea for a long time. Since the local hospital physicians and the Korean Navy physicians saw and assisted in many of these repairs, they received valuable experience and practical training.

In the surgical sphere, patients with ruptured peptic ulcers were seen fairly frequently, but often they were not brought in until they were in extremis and suffering from general peritonitis. Patients with appendicitis were frequently seen but likewise at a late stage. An *ascaris lumbricoides* was sometimes found tightly nested in the appendix. Extensive carcinomas originating in the breast and skin and producing horrible external deformities were common, as were gastro-intestinal cancers.

In the gynecologic field, so-called pelvic inflammatory disease was frequent and responded well to antibiotic therapy. The familiar conditions following childbirth, including relaxed pelvic floor, cystocele, rectocele, and prolapse of the uterus, were thought to be very common, but these patients relatively seldom presented themselves because of ancestral training and their reluctance to appear concerned with things genital. They would often come requesting medicine but would refuse examination. One surgical observer remarked that these childbirth injuries were perhaps one reason why women seldom laugh heartily in this land.

Obstetric situations were very seldom seen. Rarely, a husband would bring in his wife after ineffectual and prolonged labor and in need of operative delivery of a stillborn or macerated fetus. Occasionally a woman would be brought in because the after-birth could not be passed at home.

Undoubtedly, the most pathetic and inadequately treated patients were those with the severe burns that were so prevalent. One has but to see the crowded conditions in the mud-walled, paper-lined, straw-roofed homes to realize the ever-present danger of fire (fig. 4). For some reason, native Koreans are most reluctant to give blood, and it was seldom possible to give these patients the blood they needed. It was not feasible to start a Korean blood bank in the 1st Medical Battalion laboratory because of lack of donors.

On the more dramatic side, probably the first mitral valvotomy ever performed in South Korea was done in one of the medical companies and with excellent results. Preoperatively a two-hour vehicular trip each way to an Army evacuation hospital for a barium swallow and electrocardiogram was undertaken to confirm the clinical diagnosis of marked mitral stenosis. Another chest

surgeon performed several esophageal operations for stricture incident to accidental ingestion of lye, which is quite common among the children.



*Figure 4. Aerial view of a typical small Korean village. This one was just across the fence from the camp site of the 1st Medical Battalion Headquarters. Ricks of unthreshed rice are seen near the houses, the roofs of which are of rice straw.*

To illustrate how procedures considered simple by American standards brought the medical group local acclaim is the case of a woman who had been told by her doctor that her enlarging abdomen was due to cancer and thus there was no hope. Examination in a medical company suggested, and operation proved, this to be due to uterine fibroids, but in the minds of the patient and her friends and relatives, she had been cured of cancer. She caused many less fortunate patients to come for treatment.

Lest one think that most of the glory came to the practitioners of the surgical art, the battalion medical officer, with his small outpatient tent but abundant supply of pain-relieving drugs, antibiotics, and scalpels to relieve abscesses, received his full measure in the successful practice of medicine, and the high esteem with which he was held by his grateful patients bordered on awe.

#### RELATED ADVANTAGES OF PROGRAM

Aside from the humanitarian aspect which was so desperately patent, the training opportunities it afforded the Navy medical

officers, both in keeping them professionally busy and competent and in providing excellent training for our Korean Navy colleagues, this civilian work had its beneficial effect at the unit command level. It paved the way for better co-operation with the local populace through the tightly meshed civilian administrative organization that exists in South Korea. As an example, the Korean community would on occasion petition the local military commander requesting that the doctor be retained when he was being transferred to another assignment. These long and flowery petitions, written laboriously both in Korean and in English, were most complimentary to the individual doctor and to the 1st Marine Division whom he represented.

Again, the Civil Affairs Officer of the 1st Marine Division, through his close association with the civil population, would bring to the personal attention of the Commanding General particularly significant service of medical officers. In a similar manner, the Commanding General of the 1st Korean Marine Brigade would give his personal recognition for the work done by the Navy medical officers in connection with the training of the Korean Navy doctors and corpsmen. The local community hospital gave many individual citations to the doctors who had worked with their patients. Following a series of writeups in the 1st Marine Division's newspaper on this subject, the Pacific edition of *Stars and Stripes* published two feature articles. One told of the general practice of a battalion surgeon, the other was about the plastic and reconstructive operations performed in the 1st Medical Battalion and in the community hospital.

Probably in no place in the world is a greater return available in personal satisfaction for the medical time and effort expended as existed in the war-torn sectors of South Korea. Modern military medicine was truly operating on a frontier of great need.

This practice among the Korean civilians was in addition to the usual acute medical, surgical, and traumatic conditions presenting themselves in a group that exceeded 20,000 personnel. The 1st Medical Battalion was often called on to render medical and surgical care to units from other nearby United Nations Forces, thus affording us the opportunity to observe the customs and the way of life in cultures other than our own. A relatively close association with certain Commonwealth units was mutually very pleasant and educational. The majority of serious medical, surgical, and traumatic conditions that occurred in 1st Korean Marine Brigade military personnel were taken care of in the medical companies of the 1st Medical Battalion.

The rough, bumpy, muddy, or dusty roads in the 1st Marine Division's sector limited vehicular speed to a high average of 15 miles per hour. This, however, interposed no problem in the

transportation of military patients, as full advantage was taken of helicopter evacuation, both in the initial transfer to the medical company and subsequent movement either to the hospital ship or to Army evacuation hospitals when indicated. This rapid, relatively atraumatic method of transportation, particularly of the severely injured, was a time-saving procedure that materially reduced morbidity and sick days and that sometimes was life saving. Medical officers would often remark that they could hospitalize their patients in Korea in a shorter time than they could in the United States.

On the academic side, there were frequent medical meetings to stimulate interest in current and remote professional matters. The 1st Marine Division's medical group had a regular weekly medical meeting. The 1st Medical Battalion had two dinner meetings a week, one a journal club, the other a professional meeting. The 38th Parallel Medical Society of Korea met initially every two weeks and later once monthly. These very fine meetings were often addressed by distinguished visiting physicians and surgeons from the United States. The Military Preventive Medicine Association in Korea met monthly, and its programs were excellent. All of these meetings were from one to two or more hours away by vehicular travel, but it was indeed seldom, if ever, that a medical officer could not find transportation to attend.

Aside from great personal satisfaction which this Korean practice brought to the individual medical officer, most of those eligible found it stimulating and productive, as measured by preparation for specialty board examinations. During one year, four Navy medical officers participated in part one of the American Board of Surgery examinations held in Tokyo. Two others, one an anesthesiologist, another a plastic surgeon, were returned to the United States in a temporary additional duty status to successfully complete their specialty board examinations.

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This brief discussion of medical practice with the 1st Marine Division in Korea has been presented, to outline the opportunities that were available for extensive professional work in the civilian population as well as the military.

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# LOW-COST ULTRAVIOLET APPARATUS FOR SMALL MEDICAL FACILITIES

ROBERT E. LYONS, *Colonel, USAF (MC)*

**I**N RECENT years, inexpensive fluorescent sun lamps have been available on the market. These are similar in appearance and electrical characteristics to regular fluorescent lamps, but produce ultraviolet sunburn radiation in approximately the same spectrum as that of natural sunlight. We have found them to be ideal for the construction of a low-cost ultraviolet emitter for use in small hospitals, dispensaries, dermatology clinics, and physicians' offices. The clinical response of dermatology patients treated with this apparatus was satisfactory where an erythema producing secondary tanning was required.

## THE LAMP

The fluorescent sun lamp\* used in our clinic is a 48-inch tube, coated on the inside with a special phosphor.<sup>1</sup> Radiant energy generated within the tube excites the phosphor coating, causing emission of a large amount of ultraviolet radiation in the spectral range of 2,800 to 3,500 Angström units. The relative radiant energy distribution of the sun lamp as compared with "sunshine" carbon and natural sunlight is schematically represented in figure 1. Ordinates were arbitrarily chosen to put all maximal energy output at the same value. It can be seen that most of the output of the sun lamp occurs at wave lengths between 2,900 and 3,200 Angström units, with a peak at about 3,100 Angström units, whereas relatively little of the energy of "sunshine" carbon or of sunlight lies in this spectral range. The greatest output of "sunshine" carbon actually occurs just below 4,000 Angström units, at the upper part of the ultraviolet spectrum. Practically no radiation below 2,800 Angström units is emitted by the sun lamp, which is an advantage from the standpoint of protection of the patient's eyes.

According to Kovács,<sup>2</sup> maximal erythema effect occurs at 3,000 Angström units, with no capacity to produce erythema above 3,130 Angström units. Blum,<sup>3</sup> on the other hand, gives 2,970 Angström units as the wave length of greatest effect in producing sunburn, with little effect beyond 3,300 Angström units.

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From Headquarters, Air Materiel Force, European Area, APO 633, New York, N. Y.

\*Westinghouse Fluorescent Sun Lamp FS40T12.



## THE APPARATUS

A four-lamp fluorescent light fixture (obtainable as standard equipment at most Air Force bases) was modified by the construction of a polished aluminum reflector backing the lamps and extending, at a 30 degree angle, 8 inches beyond the sides and ends of the fixture. The added reflector, although not an essential feature, appreciably decreased the time required to give a patient an erythema dose of ultraviolet. The apparatus was hung from the ceiling above a table in the treatment room by counterbalanced suspension, thus permitting it to be elevated out of the way when not in use.

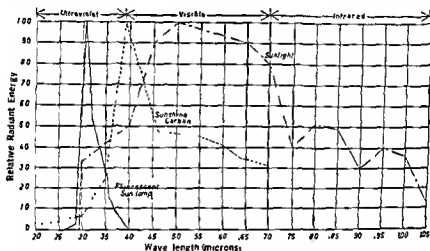


Figure 1. Radiation characteristics (quality) of fluorescent sun lamp, sunshine carbon, and sunlight.

## CALIBRATION

Each apparatus should be individually calibrated before being placed in therapeutic use. This is particularly necessary when reflectors are added, because the time in which erythema is produced at a given distance is affected by the type of aluminum used, the angles of the wings, and other variable factors. A standard of calibration is the minimal erythema dose (M.E.D.)—a reaction so slight that it is scarcely noticed by the patient and disappears in less than 24 hours.

Our calibration was accomplished at 20 inches, which we found to be the ideal working distance both for time required to give an erythema dose and for ease of handling the apparatus. In personnel not previously exposed to sunlight or other ultraviolet radiation, 2-inch squares of skin on the inner part of the forearm were exposed for 1 minute; 1 minute, 30 seconds; 2 minutes; and 2 minutes,

30 seconds, respectively. Each patient was examined at 4 hours and again at 24 hours. The square that at the first examination showed a barely perceptible erythema which disappeared in 24 hours, was taken as indicating the minimal erythema dose. The M.E.D. with our apparatus was found to be  $1\frac{1}{2}$  minutes at 20 inches, as compared with an M.E.D. of 20 minutes for June sunlight at noon.<sup>4</sup>

## RESULTS

The erythema produced by this ultraviolet emitter usually becomes apparent about two hours after exposure. Continued exposure causes a gradual tanning of the skin not unlike that produced by natural sunlight.

We have used the apparatus in psoriasis, atopic dermatitis, pityriasis rosea, alopecia areata, and selected cases of acne vulgaris, as well as for nonspecific tonic effect in other dermatoses. Patients with psoriasis were particularly benefited, and results observed in the other dermatologic conditions were as good as obtained with more expensive types of ultraviolet generators.

Similarity of the fluorescent sun lamp to sunlight in producing sunburn makes it of no value if ultraviolet therapy of the cold quartz type is desired. Emission, as in sunlight, of the 2,587 Angström band is absent.

## ADVANTAGES OVER STANDARD EQUIPMENT

**Price.** The cost of this apparatus, including fixture, aluminum backing, and four sun lamps, should not exceed \$50. The lamps have an average life of 2,500 hours when burned at 3 hours per start, and replacements are inexpensive and easily obtained. In an average dermatology clinic using this emitter for all patients requiring it, a lamp change twice a year will ensure maintenance of the standards of emission.

**Space Saving.** Counterbalanced suspension of this apparatus from the ceiling makes it possible to utilize the same room for other purposes, and avoids loss of floor space such as occurs with many types of ultraviolet generators. This is particularly important where space is at a premium.

**Time Saving.** Erythemogenic efficiency is many times that of even the strongest sunlight. Also, when indicated, the entire body can be exposed at one treatment.

**Minimal Danger to Eyes.** The radiation from sun lamps is similar to sunlight in having no component below 2,900 Angström units, so that the likelihood of eye injury from normal exposures is less than with the usual ultraviolet generator. Even so, the patient's eyes should be protected during treatment by special glasses or other means.

## SUMMARY

An efficient and inexpensive apparatus for ultraviolet therapy can be constructed at most military bases using commercially available sun lamps in a standard fluorescent light fixture modified by adding an aluminum reflector. The radiation obtained is similar to that of natural sunlight in the erythemogenic range, and clinical response of dermatologic conditions differs in no discernible way from that obtained with natural sunlight. Important advantages include low cost, economy of space, ability to radiate the entire body at one time, and accurate control of dosage.

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"BE PREPARED"

"What have we learned from the great disasters of the past? This may be summed up in a very short phrase: The absolute necessity for proper organization and direction. Without such organization, panic will ensue. This panic may be likened to the stampede of horses and cattle in a burning stable when, by milling about, they eventually destroy themselves rather than accept the way to safety. And so with the ill conceived and almost thoughtless actions of people at such times—mass hysteria if you will, prompt and vigorous leadership may prevent or quell such panic. All of our cities and towns, even our smallest communities, should be ready with a plan of action which includes assistance to their neighbors."

—FRANK B. BERRY, M. D.  
in *Bulletin of American College of Surgeons*, p. 66, Mar.-Apr. 1956

## Fever of Undetermined Origin

### Presumptive Cause, Amebic Colitis

MURRAY STROBER, *Captain, USAFR (MC)*

**T**HE CLINICAL course of amebic colitis is so variable and the causative organism often is so difficult to find, that there is ever-present danger of failure to diagnose a case, with unfortunate results for the patient. He may be asymptomatic, or may complain of any one of a wide variety of symptoms such as constipation, abdominal cramps, nausea, belching, anorexia, malaise, diarrhea, vague aches in the head or extremities, sweating, tachycardia, and fever. Pyrexia was the predominant feature of the following case, in which the evidence supported a presumptive diagnosis of amebiasis.

### CASE REPORT

A 29-year-old staff sergeant was admitted to this hospital on 14 February 1955, because of malaise. He had been in good health until in Korea about three months previously he "just did not feel well" and lost his "appetite and energy." He noted backache, slight cough, an occasional sensation of tightness in the chest, and a rare bout of diarrhea that never persisted. No melena was ever noticed. He had lost 35 pounds in the three months. The patient claimed that he ate only government-approved food in Korea and denied drinking unpasteurized milk. Powdered eggs and powdered milk were frequently consumed. He stated that he had taken all prescribed malarial medications as directed.

During the past month, while in transit to the United States, the patient had experienced fever and chills that seemed to occur twice a day. Ten days prior to admission to this hospital, he saw his family physician, who gave him three injections of penicillin without effect on the fever.

There was no history of sore throat, earache, hemoptysis, vomiting, hematemesis, jaundice, or dysuria. The patient had worked in an auto repair shop but had had no contact with any known toxic agents. Although he had been a heavy drinker, he had abstained from alcoholic beverages in the past six months. In 1947 he had been hospitalized

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From U. S. Air Force Hospital, Smoky Hill Air Force Base, Salina, Kans. Dr. Strober is now at Apt. 5G, 701 Fenimore Street, Brooklyn, N. Y.

because of an acute epididymitis and treated with "120 penicillin injections" Further than this, the history was noncontributory.

Physical examination on admission revealed a patient who appeared cachectic and was acutely ill. He had moist skin, a pulse rate of 92 per minute, and a temperature of 102°F by mouth. Otherwise, the examination was essentially negative, except that he complained of mild tenderness on palpation in the right lower part of the abdomen.

Initial laboratory data included a hemoglobin level of 11.8 g per 100 ml and a white blood cell count of 10,150 per  $\mu$ l, with a differential of 58 per cent polymorphonucleocytes, 36 per cent lymphocytes, 2 per cent monocytes, 3 per cent eosinophils, and 1 per cent basophils. The corrected sedimentation rate was 30 mm/hr. The specific gravity of the urine was 1.010, and microscopic examination of the sediment revealed from 10 to 12 white blood cells per high power field. Roentgenograms of the chest were within normal limits.

Further laboratory reports showed a nonprotein nitrogen of 45 mg per 100 ml; total protein, 9.7 g per 100 ml; albumin, 6.3 g per 100 ml; globulin, 3.4 g per 100 ml; icteric index, 3.5 units; total serum bilirubin level, 0.3 mg per 100 ml; alkaline phosphatase level, 1.5 Bodansky units. The sulfobromophthalein sodium test showed 2 per cent retention of dye in 45 minutes. The heterophil test revealed a positive titer at 1:14. A 12-lead electrocardiogram showed no axis deviation; sinus tachycardia, flat T waves in aVL. The P-R interval was 0.15 second. Three gastric analyses were performed. The specimens revealed no acid-fast organisms on smear or culture. On two of the gastric specimens no free hydrochloric acid was detected. (A histamine test was not given.) Second strength PPD skin test was positive.

For the first three weeks of hospitalization the patient ran a septic course with temperatures varying between 99°F and 103°F. He was placed on the seriously ill list and continued to lose weight although supplementary feedings were encouraged. No bacterial growth was noted from blood cultures made on six separate days when the temperature was over 101°F. Cultures also were made of two fecal and two urine specimens, but no bacterial pathogens were found. Five blood smears, both thick and thin, made when the temperature was elevated, revealed no malarial parasites. All fecal specimens, including enema products, were taken directly to the laboratory, and 20 examinations were made for parasites and ova, with negative results. An occasional stool guaiac test showed a trace reaction, but the patient had not been on a meat-free diet. Febrile agglutination studies were performed for brucella, typhosa "O", typhosa "H", paratyphoid "A", paratyphoid "B", OXK, OX2, and OX19. Titers were repeated after a 14-day interval, and no diagnostic abnormalities were noted. Several repeat complete blood cell counts revealed an occasional mild eosinophilia with white blood cell counts varying from 8 to 12,000 per  $\mu$ l. The sedimentation rate varied between 30 and 40 mm/hr. Several urine sediments showed 8 to 10 white blood cells per high power field. Although an intravenous

pyelogram revealed a small retention cyst in the right kidney, the psoas shadows were normal, no significant abnormality was encountered, and repeat physical examinations showed no change.

A proctoscopy performed under caudal anesthesia because the patient developed acutely inflamed, painful, edematous external hemorrhoids, revealed a normal mucosa to 10 cm, and smears of the mucosa showed no parasites or ova. A barium enema, given after the proctoscopy, passed unobstructed to the cecum. In the cecal area the mucosa appeared serrated, with a thickened, irregular border (fig. 1).



Figure 1. Roentgenogram taken after barium enema. The mucosa of the cecal area appears serrated, with a thickened, irregular border.

In view of fluoroscopic and roentgenologic findings that were suggestive of an inflammatory colitis in the cecum, and of the patient's febrile illness and recent return from Korea, therapeutic trial of an amebicide was warranted. Chiniofon, in 0.75-gram doses three times a day for 10 days, produced a striking clinical response. In 48 hours the temperature dropped to 98°F and stayed below 99°F for the remaining 20 days of hospitalization. The patient's toxic appearance rapidly

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# A True Hermaphrodite

EVAN L. LEWIS, *Major, MC, USA*

RICHARD W. CLETSONWAY, *Captain, MC, USA*

**I**N SEVERAL recent articles,<sup>1,2</sup> reviews of the literature have been made, bringing the total number of true hermaphrodites reported to 56 as of the date of writing. Due to the length of time between writing and publishing an article, there is a possibility of others being reported, but it is assumed that this is the 57th published case of a true hermaphrodite.

## CASE REPORT

A 10-year-old "boy" was brought to the urological clinic at this hospital for repair of hypospadias with chordee and orchiopexies. At birth it was noted that the testes were absent and there was a perineal hypospadias. His development was otherwise normal. At the age of 2 years he was taken to a urologist who advised delay of any surgical intervention until 10 years of age. At 6 years of age, a short course of gonadotropins was given without results. His general growth pattern and activities were normal for a boy of this age.

Physical examination on admission revealed a normal child except for the genitalia. The penis was of normal size but there was a marked chordee with bifid scrotum and a perineal hypospadias. The scrotal sacs were empty, and there was no evidence of a hernia. Rectal examination failed to reveal any evidence of a prostate. On 15 March 1955, under general anesthesia, cystoscopic examination revealed a dimple in the posterior urethra 0.5 cm in diameter and approximately 1.5 cm deep. The tip of the cystoscope was inserted, but no cervix or other opening could be observed. The bladder was normal. There was no prostatic urethra and no colliculus seminalis (verumontanum).

A midline incision was made in the abdomen. Examination of the pelvis revealed what appeared to be a testis, measuring 2 by 1 by 1 cm, on the right side. This organ was connected to a tube which coursed the pelvic wall and the posterior vesical surface to the midline. The testis was entirely intraperitoneal. On the left side there was a tube with a fimbriated end. Enmeshed in the fimbria was an organ 10 by 5 by 3 millimeters. The tube went along the pelvic wall and joined with the right one on the posterior wall of the bladder. There was no evidence of a uterus. The left gonad and tube were removed completely, including the point of junction with the tube from the right side. The

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From Tokyo Army Hospital, 8059th Army Unit, APO 500, San Francisco, Calif.



disappeared; he felt entirely well, had a healthy appetite, and proceeded to gain 10 pounds.

Because the patient had no free hydrochloric acid in his stomach contents on two gastric analyses, an upper gastro-intestinal study was performed prior to discharge from the hospital. No intrinsic disease of the esophagus or stomach was demonstrated. The duodenal bulb was normal, and films taken at 1-, 4-, 8-, and 24-hour intervals revealed a normal small bowel pattern. Several pictures taken as the barium filled the cecal area from above showed that the inflammatory changes which had been noted with the earlier barium enema were no longer present.

After 37 days of hospitalization, the patient was returned to active duty. Multivitamin tablets were prescribed and he was followed in the medical clinic. Physical improvement was rapid, he regained 25 pounds, and a repeat barium enema, eight weeks after discharge from the hospital, showed the cecum to be normal.

### DISCUSSION

In the differential diagnosis of prolonged fevers of obscure origin, amebiasis should be given more serious consideration than it usually is accorded. Demonstration of trophozoites or cysts of *Entameba histolytica* may be difficult where no significant diarrhea is present, but when a thorough investigation of the cause of an obscure fever or prolonged diarrhea is unsuccessful, a therapeutic trial of an effective amebicide may bring gratifying results,<sup>1</sup> provided the choice of drug or combination of drugs is suited to the sites of localization.<sup>2,3</sup> In the case presented, neither trophozoites nor cysts could be found in spite of the most careful search; however, there was a dramatic response to chiniofon that strongly supports a presumptive diagnosis of amebiasis.

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### THE RESERVE OFFICER

A highly trained, well-organized and powerful reserve force in constant readiness is vital to the survival of our way of life. With its valuable experience and its faithful regard for country the Reserve Officers Association is representative of a significant goal of our reserve program—the trained reserve officer.

—MATTHEW B. RIDGWAY, General, USA

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A 10-year-old "boy" was brought to the urological clinic at this hospital for repair of hypospadias with chordee and orchiopexies. At birth it was noted that the testes were absent and there was a perineal hypospadias. His development was otherwise normal. At the age of 2 years he was taken to a urologist who advised delay of any surgical intervention until 10 years of age. At 6 years of age, a short course of gonadotropins was given without results. His general growth pattern and activities were normal for a boy of this age.

Physical examination on admission revealed a normal child except for the genitalia. The penis was of normal size but there was a marked chordee with bifid scrotum and a perineal hypospadias. The scrotal sacs were empty, and there was no evidence of a hernia. Rectal examination failed to reveal any evidence of a prostate. On 15 March 1955, under general anesthesia, cystoscopic examination revealed a dimple in the posterior urethra 0.5 cm in diameter and approximately 1.5 cm deep. The tip of the cystoscope was inserted, but no cervix or other opening could be observed. The bladder was normal. There was no prostatic urethra and no colliculus seminalis (verumontanum).

A midline incision was made in the abdomen. Examination of the pelvis revealed what appeared to be a testis, measuring 2 by 1 by 1 cm, on the right side. This organ was connected to a tube which coursed the pelvic wall and the posterior vesical surface to the midline. The testis was entirely intraperitoneal. On the left side there was a tube with a fimbriated end. Enmeshed in the fimbria was an organ 10 by 5 by 3 millimeters. The tube went along the pelvic wall and joined with the right one on the posterior wall of the bladder. There was no evidence of a uterus. The left gonad and tube were removed completely, including the point of junction with the tube from the right side. The

From Tokyo Army Hospital, 8059th Army Unit, APO 500, San Francisco, Calif.

disappeared; he felt entirely well, had a healthy appetite, and proceeded to gain 10 pounds.

Because the patient had no free hydrochloric acid in his stomach contents on two gastric analyses, an upper gastro-intestinal study was performed prior to discharge from the hospital. No intrinsic disease of the esophagus or stomach was demonstrated. The duodenal bulb was normal, and films taken at 1-, 4-, 8-, and 24-hour intervals revealed a normal small bowel pattern. Several pictures taken as the barium filled the cecal area from above showed that the inflammatory changes which had been noted with the earlier barium enema were no longer present.

After 37 days of hospitalization, the patient was returned to active duty. Multivitamin tablets were prescribed and he was followed in the medical clinic. Physical improvement was rapid, he regained 25 pounds, and a repeat barium enema, eight weeks after discharge from the hospital, showed the cecum to be normal.

### DISCUSSION

In the differential diagnosis of prolonged fevers of obscure origin, amebiasis should be given more serious consideration than it usually is accorded. Demonstration of trophozoites or cysts of *Entamoeba histolytica* may be difficult where no significant diarrhea is present, but when a thorough investigation of the cause of an obscure fever or prolonged diarrhea is unsuccessful, a therapeutic trial of an effective amebicide may bring gratifying results,<sup>1</sup> provided the choice of drug or combination of drugs is suited to the sites of localization.<sup>2,3</sup> In the case presented, neither trophozoites nor cysts could be found in spite of the most careful search; however, there was a dramatic response to chiniofon that strongly supports a presumptive diagnosis of amebiasis.

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### THE RESERVE OFFICER

A highly trained, well-organized and powerful reserve force in constant readiness is vital to the survival of our way of life. With its valuable experience and its faithful regard for country the Reserve Officers Association is representative of a significant goal of our reserve program—the trained reserve officer.

—MATTHEW B. RIDGWAY, General, USA

The latter was made female at the age of 6 years, due to a good vagina and a small phallus.

### SUMMARY

The 57th case of a true hermaphrodite is presented. This patient probably represents a gynandromorph with extremely early arrest of development and comes under the classification of hermaphroditismus versus lateralis.<sup>5</sup> The characteristic features are: right testis and vas, left ovary and tube, absent uterus, very small vagina opening into posterior urethra, absent prostate, hypospadiac phallus with chordee, cleft scrotum, and perineal urethra.

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ADDENDUM: Since this article was submitted, a skin biopsy was made (in January 1956) and revealed a predominance of male chromosomes in the nuclei of the basal cells.

### REFERENCES

1. Schwiebinger, G. W., and Hodges, C. V.: True hermaphrodite. *J. Urol.* 73: 424-429, Feb. 1955.
2. Department of Urology (James Buchanan Brady Foundation) and Laboratory of Surgical Pathology of the New York Hospital, Cornell Medical Center, New York, N. Y.: True hermaphroditism: conference on management of one patient. *J. Urol.* 72: 77-86, July 1954.
3. Schapiro, G. (Moscow): Zur Frage des Hermaphroditismus. *Virchows Arch. f. path. Anat.* 266: 392-406, 1927. Cited in reference 5, pp. 188-190.
4. Davis, D. M., and Scheffey, L. C.: Case of true hermaphroditism. *J. Urol.* 56: 715-719, Dec. 1946.
5. Young, H. H.: *Congenital Abnormalities, Hermaphroditism and Related Adrenal Diseases*. Williams & Wilkins Co., Baltimore, Md., 1937. pp. 47, 171, 199-202.

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### THE MARK OF THE PHYSICIAN

"The mark of the true physician is his sensitivity to the needs and suffering of others. Perhaps compassion is the word best fitted to express the feeling of a physician for his suffering patient, but this does not mean that the physician can lose his objectivity while being sympathetic with his patient. Neither does it mean that his defense against his own anxiety and concern for the patient should take the form of cynicism, or a coldly scientific, hard-bitten exterior manner."

—DANA L. FARNSWORTH, M. D.  
in *New England Journal of*  
*Medicine*, pp. 561-562, Mar. 22, 1956

brought into the *scrotum* so plastic prostheses will be considered at a later date.

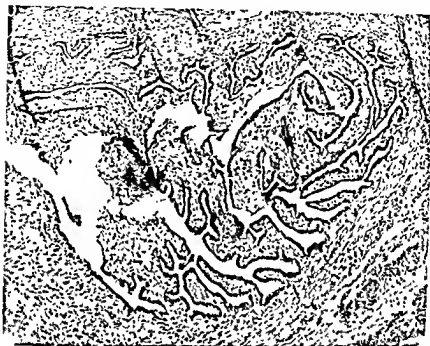


Figure 3. Section of fimbriated end of fallopian tube. ( $\times 110$ )

The vaginal dimple was not disturbed since experience has shown that its removal is not necessary and is, in fact, contra-indicated.

The biggest problem in handling this patient will be at puberty. It is anticipated that male hormone therapy will be necessary due to the absence of interstitial Leydig cells.

There are several interesting and unusual features in this patient. Both gonads were extremely immature. The tubular structure from the left gonad represents the müllerian ducts, and the one from the right definitely appeared of wolffian origin. The point of fusion was removed but had no histologic resemblance to a uterus and was not connected to the vaginal dimple. The arrest of development at such an early stage is unusual. That neither a prostate nor a uterus formed, that the vagina is small, and that both gonads are extremely immature bears out this fact. We believe that this patient is probably a gynandromorph—at most, only one stage further developed than a neuter. There are only two patients in the literature showing anywhere near this immaturity: that of Schapiro<sup>3</sup> and that of Davis and Scheffey.<sup>4</sup>

The latter was made female at the age of 6 years, due to a good vagina and a small phallus.

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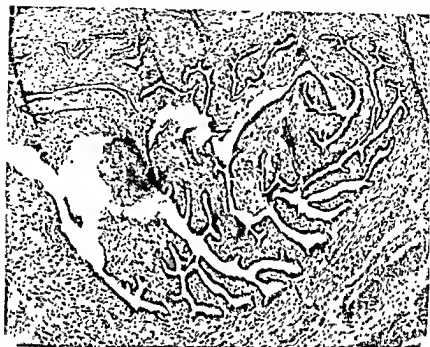
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## A MESSAGE FROM THE A. M. A.

Since January and in each successive issue of the *United States Armed Forces Medical Journal*, the A. M. A. message has been devoted to the history, organization, function, and purpose of the American Medical Association. The message this month concerns the Council on Medical Physics.

The American Medical Association House of Delegates, in December 1955 at Boston, approved a recommendation to reorganize the Council on Physical Medicine and Rehabilitation and to rename it the Council on Medical Physics. The Council on Physical Medicine and Rehabilitation, formerly the Council on Physical Therapy, was established in 1925. At that time physical medicine was a controversial field. Some physicians believed it had a great future, and others regarded it with misgivings. The former Council helped to bring order to this field and through evaluation of devices and methods it encouraged further development and utilization of many types of instruments throughout all branches of medicine.

The new Council on Medical Physics, one of the nine standing committees of the Board of Trustees, will carry on some of the functions of the former Council together with other new activities as a part of its program. In the reorganization plan the House of Delegates indicated that rehabilitation problems should be assigned to an intra-association liaison group with representatives from all interested American Medical Association councils, sections, and committees dealing with the subject.

The House of Delegates and the Board of Trustees have directed the Council on Medical Physics to carry on activities in the fields of medical apparatus, instruments, and devices. The membership of the Council will include physicians and other scientists with knowledge in the basic and medical science fields of internal medicine, physical medicine, orthopedic surgery, biophysics, radiology, physiology, otology, experimental medicine and surgery, ophthalmology, anesthesiology, pathology, dermatology, and neurology.

The purpose of the Council is in keeping with the service program of the American Medical Association to the medical profession and the public. The purpose might be stated to be the encouragement of an understanding of the actions and rational

From the Council on National Defense of the American Medical Association. The views and opinions expressed are not necessarily those of the Department of Defense.

—Editor



### TRIAL OF NEW RESPIRATORY VACCINE SUCCESSFUL

A new vaccine, developed and prepared by the Department of Respiratory Diseases at the Walter Reed Army Institute of Research, Washington, D. C., has been found to reduce the incidence of hospitalization for respiratory disease among recruits by more than 80 percent, according to a preliminary report to the Surgeon General, Department of the Army.

The vaccine was prepared from tissue cultures of monkey kidney which had been infected with the two predominant RI (also called ARD and APC) viruses. Virus in the vaccine was killed with formaldehyde, and the vaccine caused no untoward effects in the more than 350 persons who received it. The new vaccine reaches its maximum effectiveness within a week after administration.



### MICROBIAL IDENTIFICATION AID

A handy microbial identification wheel, devised by Colonel H. A. Van Auken, MC, USA, and Major C. D. Graber, MSC, USA, of the Laboratory Service, Fitzsimons Army Hospital, Denver, Colo., is available without cost from either the Difco Laboratories, Detroit 1, Mich., or Parke, Davis & Company, Detroit 32, Mich.

Various biochemical and serologic characteristics of an organism are given by turning the inside wheel until its arrow points to the suspected organism on the outer wheel.

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—Editor

uses of apparatus and methods having a physical basis for their actions for the diagnosis, treatment, and prevention of disease.

In the pursuit of this purpose, it is expected the Council will conduct a program for the evaluation of new apparatus and physical methods intended for diagnostic, therapeutic, or preventive purposes. Also, the Council may be expected to encourage the development of standards for medical apparatus by appropriate standardizing agencies. The encouragement of research to help establish the actions and rational uses of new classes of apparatus, instruments, and devices is expected to be an important challenge to this newly established Council. The Council's operation will not include the consideration of individual brands and models of devices but rather will be directed toward reporting to the profession on various classes of apparatus.

For example, an individual resuscitator would not be tested and evaluated and as such be the subject of a Council report. Instead the Council, following an extensive project of general analysis and evaluation, would consider the preparation of a report on the desirable features, actions, uses, and contra-indications for manual and mechanical methods of artificial respiration. Generally, reports of the Council would contain information regarding the actions, uses, dosage, contra-indications, and warnings regarding limits of safety for the class of apparatus under consideration.

When one reflects on the almost staggering increase in the use of instrumentation in both laboratory and clinical medicine for therapeutic, diagnostic, preventive, and research purposes, it becomes apparent that the Council can serve all of medicine by encouraging their rational use and understanding of the basic principles of physics utilized in the world of medicine today.

The organizational meeting of the Council on Medical Physics is scheduled for mid-June. Shortly after that, the Council will publish an article in *The Journal of the American Medical Association* on its new program. Quite obviously, the work of the Council cannot progress smoothly nor can its goal be accomplished without the advice and help of many physicians and other scientists throughout the country whom the Council will call upon for their expert opinion.

The research and development programs in the medical research laboratories and clinics of the Armed Forces have made significant contributions in the application of technics for the medical care of service personnel and civilians alike. The availability of such reports from these excellent military institutions should prove of immeasurable benefit to the Council in the conduct of its work. The Council anticipates harmonious relationships with the military representatives of these laboratories and clinics.

# Promotions of Officers

The following officers of the military medical services on active duty in the Army, Navy, and Air Force have recently received temporary promotions to the rank indicated.

## MEDICAL CORPS

ACKER, Donald W., Capt., USAF  
 ADAMS, Richard L., Capt., USAF  
 AINGER, Lorin E., Capt., USAF  
 AJAX, Ernest T., Capt., USAF  
 ALEXANDER, John E., Capt., USAF  
 ALEXANDER, Richmond L., Jr., Capt., USAF  
 ALT, William J., Capt., USAF  
 ANDERSON, David G., Capt., USAF  
 ANDERSON, Paul B., Capt., USAF  
 ANDREWS, Hugh K., Lt., USN  
 ANTELIS, Eugene, Capt., USAF  
 AUER, George G., Capt., USAF  
 BAH, Merle C., Capt., USAF  
 BAITCH, Arthur, Capt., USAF  
 BALDZIDOWSKI, Ralph A., Lt., USN  
 BARBE, Robert F., Capt., USAF  
 BARKER, Walter L., Lt., USN  
 BARNES, Shelby D., Capt., USAF  
 BARROWS, Howard S., Capt., USAF  
 BATES, James S., Capt., USAF  
 BATSON, Andrew P., Capt., USAF  
 BAYLEY, John F., Jr., Lt., USN  
 BAZIL, Gilbert M., Lt., USN  
 BEACH, Norman F., Capt., USAF  
 BEAVAN, Reginald A., Jr., Capt., USAF  
 BEAVERS, William R., Capt., USAF  
 BENDERSKY, Gordon, Capt., USAF  
 BERKELEY, Ralph G., Jr., Capt., USAF  
 BERKSON, David M., Capt., USAF  
 BERMAN, Harold J., Capt., USAF  
 BIGLEY, Robert H., Lt., USN  
 BOGASH, Morton, Capt., USAF  
 BOGGS, Leonard H., Capt., USAF  
 BONO, Rudolph F., Lt., USN  
 BOWEN, Clifford C., Capt., USAF  
 BOXCO, Julius A. S., Capt., USAF  
 BOYLE, James D., Capt., USAF  
 BOYLE, James J., Jr., Capt., USAF  
 BRADLEY, Charles A., III, Lt., USN  
 BRANDY, Joseph R., III, Lt., USN  
 BRISTOW, John D., Lt., USN  
 BRITTON, Joseph F., Lt., USN  
 BROCKMANN, John L., Lt., USN  
 BRONNENBERG, Neel H., Capt., USAF  
 BROWN, Royce M., Capt., USAF  
 BRUNSMAN, John A., Capt., USAF  
 BRYAN, John J., Lt., USN  
 BRYK, David P., Lt., USN  
 BUCKLEY, Harold D., Lt., USN  
 BURGOS, William F., Lt., USN  
 BURTON, Robert D., Capt., USAF  
 BUSLEPP, Robert C., Lt., USN  
 BYRD, Richard B., Capt., USAF  
 CAHILL, John J., Lt., USN  
 CAMPBELL, Calvin D., Capt., USAF  
 CANNON, James A., Lt., USN  
 CARNEVALI, John F., Capt., USAF  
 CARPENTER, Albert A., Lt., USN  
 CARPENTER, John R., Capt., USAF  
 CASTERNUOVO-TEDESCO, Pietro, Capt., USAF  
 CAUGHRAN, John H., Capt., USAF  
 CHANEY, James W., Lt., USN  
 CHOPPIN, Purnell W., Capt., USAF  
 CHUNN, Samuel P., Capt., USAF  
 CLARK, Orville S., Capt., USAF  
 CLARKE, James A., Lt., USN  
 CLINE, Albert H., Capt., USAF  
 COBBS, Wilson N., Capt., USAF  
 COFFEY, James H., Capt., USAF  
 COFFEY, William F. X., Lt., USN  
 COHEN, Jack J., Lt., USN  
 COLLINS, George P., Capt., USAF  
 COMO, Nicholas F., Lt., USN  
 CONFORTO, Lawrence J., Capt., USAF  
 CONOAN, Eduardo A., Lt., USN  
 COUGHLIN, Dennis, Jr., Lt., USN  
 COVALESKY, Bernard M., Capt., USAF  
 COX, John P., Capt., USAF  
 COX, Thomas J., Lt., USN  
 CRAWFORD, Chester W., Capt., USAF  
 CRAWFORD, Perry F., Capt., USAF  
 CRAWFORD, Robert O., Jr., Lt., USN  
 CRISTOL, David A., Capt., USAF  
 CROMEANS, Joe G., Capt., USAF  
 CRUZ-HERNANDEZ, Hector, Capt., USAF  
 CULLEY, Thomas S., Capt., USAF  
 CURETON, Robert E., Jr., Capt., USAF  
 DALLMAN, Peter R., Lt., USN  
 DANZIGER, Irwin, Lt., USN  
 DELANEY, Lawrence J., Lt., USN  
 DONALD, Robert H., Lt., USN  
 DOWNS, Haskell E., Capt., USAF  
 DREWS, Elmer C., Lt., USN  
 EATON, Edward H., Capt., USAF  
 EICHHORN, Erwin A., Capt., USAF  
 EISENLOHR, John E., Lt., USN  
 ELDREDGE, James H., Lt., USN  
 ENRIQUEZ, Jorge C., Lt., USN  
 ENSLEN, Philip J., Lt., USN  
 ERVANIAN, Alexander, Lt., USN  
 EVANS, Clarence C., Capt., USAF  
 EVENSON, David J., Capt., USAF  
 FAHRINGER, Robert R., Lt., USN  
 FAIRBANKS, Virgil F., Lt., USN  
 FEEZEL, Richard A., Capt., USAF  
 FENCL, Howard L., Capt., USAF  
 FEZZA, Stuart L., Capt., USAF  
 FISHER, Delbert A., Capt., USAF  
 FORD, Peter S., Capt., USAF  
 FORDHAM, Henry C., Lt., USN  
 FORRESTER, Eugene N., Lt., USN  
 FRITZLEN, Thomas J., Lt., USN  
 GABLE, Walter D., Lt., USN  
 GAMBLE, William E., Lt., USN  
 GARDNER, Herbert C., Lt., USN  
 GARTNER, Albert A., Capt., USAF  
 GATHE, Joseph C., Capt., USAF  
 GAUER, Robert J., Capt., USAF  
 GENNER, Byron A., III, Capt., USAF  
 GLICK, Leonard B., Capt., USAF  
 GLICKLICH, Donald, Capt., USAF  
 GLICKMAN, Franklin S., Capt., USAF  
 GLICKMAN, Paul B., Capt., USAF  
 GOETZ, Paul C., Jr., Lt., USN  
 GOETZ, Robert L., Lt., USN  
 GOLODETZ, Arnold, Capt., USAF  
 GORDON, Harold, Capt., USAF  
 GRINSELL, Harvey J., Jr., Lt., USN  
 GROSSMAN, William I., Capt., USAF  
 GROW, Buel K., Jr., Capt., USAF  
 GUNNING, Jean J., Lt., USN  
 GUSTAFSON, David C., Capt., USAF  
 HALFORD, Jack R., Lt., USN  
 HAMLISCH, Robert E., Capt., USAF

HAMMACK, William J., Lt., USN  
 HARDEN, Arthur G., Lt., USN  
 HARRIGER, Clyde E., Capt., USAF  
 HARRIS, Max E., Capt., USAF  
 HARRISON, William S., Capt., USAF  
 HARTMANN, Alexis F., Jr., Capt., USAF  
 HAUTPMANN, William L., Capt., USAF  
 HECKLAU, Edmond F., Lt., USN  
 HEIN, Walter R., Capt., USAF  
 HEKING, Robert J., Capt., USAF  
 HELLER, Arthur, Capt., USAF  
 HENDERSON, Milton E., Lt., USN  
 HENDRIX, Sam V., Capt., USAF  
 HENRY, William J., Lt., USN  
 HERING, Norton, Lt., USN  
 HESSEL, Herman L., Capt., USAF  
 HESTER, Thomas H., Capt., USAF  
 HEYWOOD, Robert M., Lt., USN  
 HICKS, Julius N., Capt., USAF  
 HONSTEN, Clyde E., Jr., Lt., USN  
 HURLEY, Jerome E., Capt., USAF  
 HURST, Alfred L., Capt., USAF  
 JOHANSON, Paul H., Capt., USAF  
 JOHNSON, Allan F., Lt., USN  
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 JORDHEIM, Robert P., Capt., USAF  
 JORGENSEN, Edward O., Capt., USAF  
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 KAHN, Alvin, Capt., USAF  
 KALINITSKY, Eugene, Capt., USAF  
 KAMNSTEIN, Phillip, Capt., USAF  
 KARCH, Everett H., Capt., USAF  
 KATKOV, Harold, Lt., USN  
 KEEGAN, Harold R., Lt., USN  
 KEISKER, Henry V., Jr., Capt., USAF  
 KENDALL, John H., Lt., USN  
 KENDALL, Ralph L., Capt., USAF  
 KEYES, Charles E., Capt., USAF  
 KINGERY, Frederick J., Capt., USAF  
 KISSEL, Wesley A., Capt., USAF  
 KITZ, Richard J., Lt., USN  
 KLASS, Donald W., Capt., USAF  
 KORNFIELD, Donald S., Capt., USAF  
 KOTT, Alexander, Capt., USAF  
 KRAMER, Charles J., Capt., USAF  
 KRAMER, Norman C., Capt., USAF  
 KRAUSE, Arnold N., Capt., USAF  
 KRAVETZ, Russell S., Lt., USN  
 KREMEN, Samuel, Capt., USAF  
 KROUT, Floyd M., Capt., USAF  
 KSEK, Archie J., Lt., USN  
 KRUMHOLTZ, Burton A., Lt., USN  
 KUFERMAN, Irving, Capt., USAF  
 KURTH, Leroy E., Jr., Lt., USN  
 KYLE, Robert A., Capt., USAF  
 LAMOUNT, Richard L., Capt., USA  
 LAKE, James M., Capt., USAF  
 LANGDON, David E., Capt., USAF  
 LAUSA, Ralph D., Capt., USA  
 LAZAR, Harold P., Capt., USAF  
 LEDBETTER, John W., Capt., USAF  
 LEE, Gary M., Capt., USAF  
 LEE, William L., Jr., Capt., USAF  
 LEMANN, Jacob, Jr., Lt., USN  
 LEONARD, Kenneth C., Lt., USN  
 LERNER, Paul M., Lt., USN  
 LEVINSON, Irwin A., Capt., USAF  
 LINDGAY, James L., Lt., USN  
 LIPSCHUTZ, Sheldon N., Lt., USN  
 LONGBAUGH, Thomas B., Lt., USN  
 ROSE, Lt., USN  
 Emmet M., Jr., Lt., USN  
 r J., Capt., USAF  
 A., Capt., USAF  
 1 C., Jr., Lt., USN  
 MATECKA, William E., Capt., USAF  
 MATHEWS, Raymond L., Capt., USAF  
 MAY, Lewis H. V., Capt., USAF  
 McALPINE, Frederick S., Lt., USN  
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 McCALLUM, James E., Jr., Lt., USN  
 McCARTHY, David E., Capt., USAF  
 McClARD, Gerald J., Lt., USN  
 McCLELLAN, Verne L., Capt., USAF  
 McCLESKEY, Otis L., Capt., USAF  
 McCLOURE, Jere P., Capt., USAF  
 McDONALD, Edgar E., Lt., USN  
 McELHINNEY, Andy J., Jr., Lt., USN  
 McGRATH, David J., Lt., USN  
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 McNALLY, Joseph F., Capt., USAF  
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 MICHELS, Joseph T., Capt., USAF  
 MILLARD, David L., Lt., USN  
 MILLER, David, Capt., USAF  
 MILLER, Luther E., Capt., USAF  
 MILLER, Richard J., Lt., USN  
 MINZER, Eugene R., Capt., USAF  
 MITCHELL, Roy A., Jr., Lt., USN  
 MOLES, Marvin R., Capt., USAF  
 MOORE, George A., Jr., Lt., USN  
 MOOREHEAD, Samuel R., Jr., Capt., USAF  
 MORAN, Leo J., Capt., USAF  
 MOREY, Edwin E., Lt., USN  
 MORRIS, James E., Jr., Capt., USAF  
 MOSKOWITZ, Roland W., Capt., USAF  
 MOYER, John A., Lt., USN  
 MULOPULOS, Sam J., Capt., USAF  
 MURPHY, Daniel J., Capt., USAF  
 MURPHY, John D., Lt., USN  
 MUSELES, Melvia, Lt., USN  
 MYHRE, Byron A., Capt., USAF  
 NAFZINGER, Moses L., Lt., USN  
 NALEBUFF, Edward A., Capt., USAF  
 NELSON, Norman H., Lt., USN  
 NEU, Leo T., Jr., Capt., USAF  
 PAPPAS, William G., Capt., USAF  
 PARKER, Edward C., Jr., Capt., USAF  
 PARKS, Parry W., Lt., USN  
 PARMAN, Robert D., Lt., USN  
 PEARSON, Randall E., Lt., USN  
 PENT, David, Lt., USN  
 PEZANOSKI, Edward J., Capt., USAF  
 PICOTTE, Benjamin M., Jr., Capt., USAF  
 POOLE, Robert S., Capt., USAF  
 PORTNEY, Fred R., Lt., USN  
 POGAN, Trygve, Lt., USN  
 POTASH, Irwin M., Capt., USAF  
 POULINES, Angel E., Lt., USN  
 PRIDGEN, William R., Lt., USN  
 PRUETT, Harry J., Jr., Capt., USAF  
 PRZYMYSZNY, John C., Lt., USN  
 RABCEVICH, Anatole, Lt., USN  
 RADKE, Hubert M., Lt., USN  
 RAFFERTY, Hugh P., Lt., USN  
 RALSKE, Norman H., Capt., USAF  
 RAPHAEL, James C., Jr., Capt., USAF  
 RAUCH, Robert J., Capt., USAF  
 RAWL, Jasper F., Jr., Lt., USN  
 REEVES, Henry G., Jr., Capt., USAF  
 ROMANUK, Flavius C. A., Lt., USN  
 ROOT, Irving, Lt., USN  
 ROSENBERG, Lawrence C., Lt., USN  
 ROSENGARTEN, Robert, Capt., USAF  
 ROTCHFORD, James P., Capt., USAF  
 ROUSE, Robert M., Capt., USAF

# MEDICAL CORPS—Continued

RUCCI, Eustine P., Lt., USN  
 RUIZ, Frederick J., Sr., Capt., USAF  
 RUTTEN, Ruben J., Lt., USN  
 RYCH, Alden B., Capt., USAF  
 SAADE, John E., Capt., USAF  
 SAMET, Charles M., Capt., USAF  
 SANDBERG, Herschel, Lt., USN  
 SATTER, Erby J., Capt., USAF  
 SAUNDERS, John C., Capt., USAF  
 SAUNDERS, Stephen B., Lt., USN  
 SAVUKINAS, Vincent E., Capt., USAF  
 SCANDURA, Rosario A., Lt., USN  
 SCHAUER, David H., Capt., USAF  
 SCHEFFSTAD, Wilbur J., Lt., USN  
 SCHNACK, John D., Capt., USAF  
 SCHNUTE, Richard B., Lt., USN  
 SCHNEBERG, Sheldon, Capt., USAF  
 SCHULTZ, David W., Lt., USN  
 SCHULZE, Victor E., Capt., USAF  
 SEARS, Marvin L., Capt., USAF  
 SEAY, James E., Capt., USAF  
 SELANDER, Olaf E., Capt., USAF  
 SELINGER, Harold, Capt., USAF  
 SHANE, Morton, Capt., USAF  
 SHARPE, Eugene B., Capt., USAF  
 SIRCPULOS, George P., Capt., USAF  
 SHUGOLL, Gerald L., Lt., USN  
 SHULMAN, Kenneth, Lt., USN  
 SINGER, Ellis F., Capt., USAF  
 SMITH, Clarence G., Capt., USAF  
 SMITH, Claude A., Capt., USAF  
 SMITH, Marlon L., Lt., USN  
 SMITH, Thomas H., Jr., Lt., USN  
 SMITH, Wallace B., Lt., USN  
 SMYTH, James W., Lt., USN  
 SPEAR, Horace L., Capt., USAF  
 SPECKMAN, Glenn H., Lt., USN  
 SPERLING, Paul R., Jr., Lt., USN  
 STADLER, Richard C., Lt., USN  
 STAMM, Charles F., Capt., USAF  
 STEMMER, Edward A., Capt., USAF  
 STENZEL, David M., Lt., USN  
 STEPH, Donald W., Capt., USAF  
 STEWARD, John F., Lt., USN  
 STEWELL, Clifford L., Lt., USN  
 STRICKLAND, William H., Capt., USAF  
 SUER, William D., Lt., USN  
 SULLIVAN, James J., Lt., USN  
 SWIHART, Paddy D., Capt., USAF  
 TAYLOR, Harry C., Capt., USAF  
 TAYLOR, Robert V., Lt., USN  
 TERRY, John A., Lt., USN

TRETTLE, Raymond J., Lt., USN  
 TRUMPOUR, Donald J., Capt., USAF  
 TSCHETTER, Clifford N., Capt., USAF  
 TUPPER, James W., Lt., USN  
 TURKEWITZ, Hyman, Capt., USAF  
 UETZMANN, Immanuel F., Capt., USAF  
 UNGER, Pat B., Lt., USN  
 UTHLAUT, William W., Lt., USN  
 VALASKE, Martin J., Lt., USN  
 VASQUEZ, Mario A., Lt., USN  
 VASSALLO, Michael, Lt., USN  
 VISCARDI, John P., Jr., Capt., USAF  
 VOSS, Marilyn W., Lt., USN  
 WALL, Thomas, Capt., USAF  
 WALLACE, Edward R., Lt., USN  
 WALMSLEY, George L., Capt., USAF  
 WALTER, William J., Lt., USN  
 WARMUND, Stanley K., Lt., USN  
 WARNER, Richard P. P., Capt., USAF  
 WARREN, James C., Lt., USN  
 WATERMANN, Clarence E., Lt., USN  
 WATT, Russell H., Jr., Capt., USAF  
 WAYS, Peter O., Capt., USAF  
 WEBB, Edward D., Capt., USAF  
 WEBER, Murry K., Lt., USN  
 WENNER, Allan D., Lt., USN  
 WENNER, Bernard K., Capt., USAF  
 WENNER, Israel H., Capt., USAF  
 WEISS, Albert E., Lt., USN  
 WELZANT, Walter R., Lt., USN  
 WERR, Joseph A., Lt., USN  
 WEYMAN, Donald R., Capt., USAF  
 WHEELER, Jewitt E., Jr., Capt., USAF  
 WHITLOCK, Charles B., Lt., USN  
 WICKHAM, Robert A., Capt., USAF  
 WILLIAMS, Jack E., Capt., USAF  
 WILLIAMS, Thomas W., Lt., USN  
 WILSON, James D., Capt., USAF  
 WILSON, Robert J., Lt., USN  
 WING, John E., Jr., Lt., USN  
 WINOGRAD, Herbert L., Capt., USAF  
 WISE, John D., Capt., USAF  
 WISEMAN, James A., Lt., USN  
 WOLANSKY, Jacob, Lt., USN  
 WORTHAM, Julius P., Jr., Lt., USN  
 YARBERRY, Otha H., Jr., Lt., USN  
 YOUNG, William F., Capt., USAF  
 YOW, John C., Jr., Capt., USAF  
 YUNGWANG, Carl, Lt., USN  
 ZARTMAN, Harvey F., Capt., USAF  
 ZIMMERMAN, Martin P., Capt., USAF  
 ZIMMERMAN, Martin P., Capt., USAF

GOLDSTEIN, Herbert A., Lt., USN  
 GONZALES, Roy R., Capt., USAF  
 GOODSETT, David M., Jr., Capt., USAF  
 GORDON, Edward R., Lt., USN  
 GORDON, Herbert P., Capt., USAF  
 GORDON, William, Lt., USN  
 GORMAN, Walter J., Lt., USN  
 GREEK, William J., Lt., USN  
 GREEN, John M., Capt., USAF  
 GREENLEE, Richard F., Lt., USN  
 GREMBAN, Harry A., Lt., USN  
 GROVE, Raymond L., Capt., USAF  
 GRUNDMEYER, Elmer P., Jr., Capt., USAF  
 HALE, William R., Capt., USAF  
 HALL, Arthur E., Capt., USAF  
 HAMULA, Warren, Capt., USAF  
 HATCH, Edward L., Capt., USAF  
 HAYES, David L., Capt., USAF  
 HEATH, Robert W., Capt., USAF  
 HEILBRUNN, Fred D., Capt., USAF  
 HEIL, Anton J., Jr., Capt., USAF  
 HEIGY, Frank A., Capt., USAF  
 HIRSCHMAN, Lewis A., Lt., USN  
 HOGAN, David W., Capt., USAF  
 HOLMES, John B., Lt., USN  
 HOROWITZ, Jerome E., Lt., USN  
 HUBER, George B., Lt., USN  
 HUDSON, Billy B., Capt., USAF  
 HULSEBOGH, Thomas A., Capt., USAF  
 HUSCHART, Vincent J., Capt., USAF  
 HYNES, Francis J., Lt., USN  
 IIDA, Harry T., Capt., USAF  
 JENNINGS, Edward J., Jr., Lt., USN  
 JOHNSON, Ardee, Capt., USAF  
 KELLY, Thomas W., Capt., USAF  
 KOEHLER, Gilbert L., Capt., USAF  
 KORN, Sheldon, Capt., USAF  
 KRATOCHWILL, Michael J., Capt., USAF  
 KRZATOKI, Stanley A., Capt., USAF  
 LADES, Lawrence G., Capt., USAF  
 LANEY, William R., Capt., USAF  
 LAVSON, James D., Capt., USAF  
 LEGAULT, Robert L., Capt., USAF  
 LEIFER, Calvin, Capt., USAF  
 LEVIN, Irving S., Capt., USAF  
 LIPPI, Anthony A., Capt., USAF  
 LOPEZ, Armando G., Capt., USAF  
 LURIE, Bertram S., Capt., USAF  
 MAASS, Robert J., Capt., USAF  
 MAEUSER, John E., Capt., USAF  
 MAGUIPE, Hugh F., Capt., USAF  
 MASON, Max G., Capt., USAF  
 MASTY, James A., Capt., USAF  
 McLAUGHLIN, Dennis L. J., Lt., USN  
 McLAUGHLIN, Wayne L., Capt., USAF  
 MELLANG, Maynard A., Capt., USAF  
 MELLERT, William D., Lt., USN  
 MERCER, James F., Capt., USAF  
 METZGER, Francis G., Capt., USAF  
 MEULLER, Herbert J., 1<sup>st</sup>, USN  
 MOLLER, Jack L., Lt., USN  
 MILLER, John H., Capt., USAF  
 MILLICAN, Richard D., Capt., USAF  
 MILLIETTE, Thomas F., Lt., USN  
 MITCHELL, Gerald A., Jr., Capt., USAF  
 MOLL, Richard A., Lt. Col., USA  
 MONTGOMERY, Ralph E., Capt., USAF  
 MOORE, Andrew, Capt., USAF  
 MORAY, Robert S., Capt., USAF  
 MORRIS, Robert W., Lt., USN  
 MOYEL, Robert E., Capt., USAF  
 NELMS, Tip C., Capt., USAF  
 ORTELERE, Robert A., Capt., USAF  
 OWENS, John J., Capt., USAF  
 PARADES, Ronald A., Lt., USN  
 PARKER, Donald R., Lt., USN  
 PARKER, Leroy A., Lt., USN  
 PARKES, Robert B., Capt., USAF  
 PAULIKOWSKI, Fred L., Capt., USAF  
 PEKIN, Richard J., Lt., USN  
 FELTER, James R., Capt., USAF  
 PENNY, William G., Capt., USAF  
 PERKINS, Robert R., Capt., USAF  
 PETERSEN, Sidney D., Jr., Capt., USAF  
 PETLAK, Frank R., Jr., Capt., USAF  
 PIKE, Frederick P., Capt., USAF  
 POIN, Michael F. M., Capt., USAF  
 POWERS, George E., Capt., USAF  
 REYNOLDS, Dean R., Capt., USAF  
 REYNOLDS, Thomas E., Capt., USAF  
 ROLLINS, Robert W., Capt., USAF  
 ROOT, Donald K., Capt., USAF  
 ROSENBERG, Alan B., Capt., USAF  
 ROZANSKI, Lawrence T., Capt., USAF  
 RUTHERFORD, Oliver H., Jr., Capt., USAF  
 SCHWALLER, William C., Capt., USAF  
 SENGELMANN, Samuel S., Jr., Capt., USAF  
 SEVITTS, James B., Capt., USAF  
 SHANK, Thomas A., Capt., USAF  
 SIFE, Harold G., Capt., USAF  
 SISLEY, Richard N., Lt., USN  
 SITTINGER, Eugene F., Capt., USAF  
 SKIBA, Gerald A., Capt., USAF  
 SMITH, Charles E., Capt., USAF  
 SMITH, Donald G., Capt., USAF  
 SMITH, Robert F., Lt., USN  
 SNYDER, Hugh P., Lt., USN  
 SNYDER, William G., Lt., USN  
 SODERSTROM, Ernest P., Capt., USAF  
 SONNLEITER, Eugene T., Lt., USN  
 SPARKS, Rex M., Capt., USAF  
 SPEARS, Charles E., Capt., USAF  
 SPECK, Morton, Lt., USN  
 SPERBER, Norman D., Lt., USN  
 STALVEY, Arman D., Capt., USAF  
 STANCIL, Arthur C., Capt., USAF  
 STARSHAK, Thomas J., Lt., USN  
 STEARN, Rexford M., Jr., Lt., USN  
 STEFAN, Leonard J., Capt., USAF  
 STEINBERG, Arnold D., Capt., USAF  
 STEVENS, Elmer J., Lt., USN  
 STEVENS, Otto O., Jr., Lt., USN  
 STUCKI, Grant A., Capt., USAF  
 TEMPERLAKE, Wayne, Capt., USAF  
 TORDCH, George, Capt., USAF  
 TUCKER, Bill E., Capt., USAF  
 WAGNER, Charles F., Capt., USAF  
 WAGNER, Norman E., Capt., USAF  
 VALKER, Daniel G., Capt., USAF  
 WEBB, Ernest J., Capt., USAF  
 WESS, David E., Capt., USAF  
 WHITE, John P., Jr., Capt., USAF  
 WHITE, John W., Capt., USAF  
 WETTMAN, Jack D., Capt., USAF  
 WILLIAMS, George R., Capt., USAF  
 WILLIAMS, James E., Capt., USAF  
 WOLFE, Charles H., Capt., USAF  
 WOOD, Eason K., Jr., Capt., USAF

## OFFICERS CERTIFIED BY SPECIALTY BOARDS

### Supplementary Listing

According to current information from the Offices of the Surgeons General of the three military medical services, the following 20 officers have been certified by the boards indicated, since the listings published in successive issues of this *Journal* from October 1953 to April 1955.

### Dental Corps

#### American Board of Periodontology

Charles F. Sumner, III, Capt., USA

#### American Board of Oral Pathology

William G. Sprague, Capt., USAF

#### American Board of Oral Surgery

Ogden M. Frank, Lt. Col., USA

William B. Johnson, Capt., USN

Harvey S. Johnson, Capt., USN

Winlaw A. Priebe, Col., USA

#### American Board of Prosthodontics

John P. Christensen, Lt. Col., USA

William E. Gullett, Capt., USN

Perry W. Bascom, Lt. Col., USA

James B. Lepley, Comdr., USN

Walter J. Demer, Capt., USN

Robert B. Lytle, Capt., USN

Oren H. Gaver, Lt. Comdr., USN

Kenneth D. Rudd, Maj., USAF

### Veterinary Corps

#### American College of Veterinary Pathologists

Daniel P. Sasmore, Lt. Col., USAF

#### American Board of Veterinary Public Health

Kenneth F. Burns, Lt. Col., USA

Mervyn B. Starnes, Col., USA

Philip R. Carter, Col., USA

Albert A. Taylor, Lt. Col., USAF

Charles H. Snider, Lt. Col., USAF

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## OFFICIAL DECORATIONS

### LEGION OF MERIT

Donald D. Flickinger, Brig. Gen., USAF (MC)

### COMMENDATION RIBBON

Walter H. Bird, Col., USAF (DC)  
John A. Durany, 1st Lt., MSC, USA  
Carroll D. Goon, Capt., MC, USA  
Frank E. Hicks, Jr., 1st Lt., MSC, USA

Howard R. Lawrence, Lt. Col., USAF (MC)  
John E. Roberts, Col., USAF (MC)\*  
John K. Sitzman, Col., USAF (DC)

\*First oak leaf cluster



### FIRST INTER-AMERICAN CONFERENCE ON OCCUPATIONAL MEDICINE AND TOXICOLOGY

The first Inter-American Conference on Occupational Medicine and Toxicology will be held jointly by the University of Miami School of Medicine and the University of Havana School of Medicine 3 to 7 September 1956 in Miami. This year the University of Miami School of Medicine will serve as host. General Chairman is Dr. Homer F. Marsh, Dean of the University of Miami School of Medicine. The official language of the program will be Spanish.

Speakers from Venezuela, Mexico, Peru, Colombia, Chile, Puerto Rico, Cuba, and the United States will present papers on such topics as "A Medical Department in Industry," "Work and Fatigue in Industry," "Effects of Environmental Conditions on the Health of the Occupational Worker," "Recording of Medical Case Histories," "Occupation and Heart Disease," "The Treatment of Intoxications by Organic Phosphates," "Management of Berylliosis," and "Treatment of Manganese Intoxications."

## Reviews of Recent Books

THE ROLE OF ALGAE AND PLANKTON IN MEDICINE, by *Morton Schwimmer*, M. D. and *David Schwimmer*, M. D., F. A. C. P. 85 pages. Grune & Stratton, Inc., New York, N. Y., 1955. Price \$3.75.

This is an unusual book. In a mere 65 text pages the authors have reviewed an extensive literature (with actual reference to 312 publications) on the subject of the medical aspects of algae and plankton. These simple forms of life encompass diatoms, unicellular flagellates, *Chlorella*, shrimplike Crustacea, seaweeds, et cetera. They have been used in various ways in medicine for thousands of years. Current interest has been revived on the basis of the potentially enormous food supply available to mankind from the ocean. Among other medical aspects discussed are the allergic dermatitides, gastroenteritides, certain shellfish poisonings, and problems of water supply and sewage disposal. Although the subject matter is unfamiliar to most readers, this field does cross specialty interests and will contact almost every aspect of medical practice. The authors have provided us with a stimulating survey of a matter which will undoubtedly grow rapidly in importance.—S. O. WAIFE, Lt. Comdr., MC, USNR

BASIC SURGICAL SKILLS, A Manual with Appropriate Exercises, by *Robert Tauber*, M. D., F. A. C. S. 75 pages; illustrated. W. B. Saunders Co., Philadelphia, Pa., 1955.

This book presents a number of basic surgical maneuvers (knot-tying, suturing, et cetera), most of which are illustrated by line drawings. Purchase of the book entitles the buyer to a "training board" without additional charge. The "training board" is a 11½ by 12-inch board of pine wood to which can be attached hooks, nails, rods, rings, and gauze pads to aid in actual practice of the maneuvers presented in the book. The descriptions are concise and clearly presented. The line drawings are excellent and the multiple-figure sequences are easy to follow.

Although the concept of the presentation of basic surgical maneuvers accompanied by actual training exercises is to be commended, there are certain deficiencies in the book which must be noted.

A book of this sort should either present virtually all the accepted basic surgical maneuvers of all the surgical specialties or it should present a representative group of the most commonly used maneuvers. This book does neither. Instead it presents an assortment of surgical maneuvers which doubtless have served the author well but which are not necessarily representative of surgical technic in general.

For example, the method given for tying the so-called "slow" square knot (two-handed square knot) appears to be merely a modification of

the one-handed or "fast" square knot. Such a method would appear to be unsuitable for tying sutures under tension. Some evidence to support this view is given by the fact that the author devotes two pages and two figures to describing the use of a "knorholder" clamp which "prevents the knot from getting loose during the second half of the tying maneuver." In the reviewer's experience and observations, such a method for tying under tension is rarely used. One of the conventional two-handed square knots, which assures better control of the suture, would seem more appropriate if only one method is to be presented.

Throughout the book, one recognizes technics that are used particularly by gynecologists and obstetricians but that are not commonly used by surgeons of other specialties. If the book is to bear out its title, it should give proper representation to the technics of all the surgical specialties.

The need for a book of this sort is recognized, and the idea of practical exercises on the "training board" is heartily endorsed. With appropriate revisions, the book can be highly recommended for anyone anticipating a career in any field of surgery. As such, it might make a worthwhile addition to the curriculum of the undergraduate medical student.

—JAMES H. STEWART, Lt. Comdr., MC, USN

**CLINICAL ANALGETICS**, by E. G. Gross, Ph. D., M. D., and M. J. Schiffin, Ph. D. American Lecture Series, Publication No. 273, A Monograph in American Lectures in Pharmacology, edited by Chauncey D. Leake, Ph. D. 101 pages; illustrated. Charles C Thomas, Publisher, Springfield, Ill., 1955. Price \$3.

This volume is a readily usable work on the commonly used analgetics. The authors state the purpose of the monograph is to provide a concise, practical guide on analgetics for the general practitioner, dentist, pharmacist, and medical student. Short descriptions of the commonly used agents include salicylates, opiates, opioids, opiate antagonists, and local anesthetics.

A bibliography follows each chapter for further investigation of the agents described. Tables are given of commonly met proprietary preparations and the contents of such preparations.

Though the material in this monograph is not as extensive or as complete as found in standard textbooks on pharmacology, and the concepts presented are new in few instances, it is useful as a reference.

—WILLIAM S. GEORGE, Col., MC, USA

**HYPOTHERMIC ANESTHESIA**, by Robert W. Virtue, M. D., Ph. D. A Monograph in American Lectures in Anesthesiology, edited by John Adriani, M. D. 62 pages. Charles C Thomas, Publisher, Springfield, Ill., 1955. Price \$2.50.

This monograph is a comprehensive review of the experimental and clinical application of hypothermia. The title, however, is misleading. As written, the reader would expect to read about the problems of

administering anesthetics to patients whose body temperature is to be lowered for certain surgical procedures. Actually, only a few pages are devoted to this facet of the general problem of hypothermia. The remainder of the monograph is concerned with a review of published reports and the author's personal experience with the use of cold hypothermia in medicine.

The monograph is short, concise, and informative. It is an excellent reference for source material for review and is highly recommended for both surgeon and anesthesiologist. — JAMES G. KURFEES, *Capt., MC, USN*

INTRODUCTION TO OPERATING-ROOM TECHNIQUE, by *Edna Cornelia Berry, R. N., and Mary Louise Kohn, R. N., M. N.* 154 pages. The Blakiston Division, McGraw-Hill Book Co., Inc., New York, N. Y., 1955. Price \$4.

This timely and well-written textbook for students in operating-room technic will also serve for training nonprofessional personnel and as a review for the graduate nurse.

Sufficient background in surgery is included to make interesting but not time-consuming reading. The description of special equipment is adequate. Either basic technics and required equipment are fully described, or suitable references are given at the end of each chapter. The questions and assignment at the end of each chapter place emphasis on the important points. Pre- and post-operative care of the patient which is important and often omitted in books on operating-room technic is briefly discussed.

The author stresses the fact that anything that hangs over the edge of a sterile table should not be used as sterile; however, the illustration of instruments in a sterile setup shows them hanging over the edge of the table. This is not consistent with the technic advocated by the authors. Some additional points should have been stressed as not good technic, such as the use of the hot plate for sterile solutions in the operating room and the use of pins in sterile supplies.

The interesting chapter on radium will be of value to the reader. The one on anesthesia is an important addition to the book and is adequately covered; however, the chapter on medicolegal aspects is very brief and does not seem emphatic enough.

The print of the book is clear and easy to read, and the illustrations are effective. I would highly recommend this book as a textbook for teaching operating-room technic.

—EDITH L. SHUTT, *Maj., ANC, USA*

COMPLICATIONS OF REGIONAL ANESTHESIA, Etiology, Signs and Symptoms, Treatment, by *Daniel C. Moore, M. D.* 291 pages; illustrated. Charles C Thomas, Publisher, Springfield, Ill., 1955. Price \$10.50.

This book is essentially an elaboration of the material which is found not only in this author's earlier text, *Regional Anesthesia*, but also in

the several excellent texts on this subject now available. It is an excellent reference for a teaching program but seems a little too expensive for its value to the practicing anesthesiologist. The book offers a fine collection of references at the end of each chapter which makes it even more desirable for a teaching library. The text is somewhat repetitive and more space is given to complications of the very rare blocks than seems necessary. By condensing some of the chapters, the book might be made cheaper and thus become a must book for all anesthesiologists. The illustrations, as usual with this author, are superb, and their reproduction by the publisher excellent.—*DAVID E. MacQUIGG, Maj., MC, USA*

**RADIOGRAPHIC ATLAS OF SKELETAL DEVELOPMENT OF THE KNEE, A Standard of Reference**, by *S. Idell Pyle, Ph. D. and Normand L. Hoerr, Ph. D., M. D.* 82 pages; 29 plates. Charles C Thomas, Publisher, Springfield, Ill., 1955. Price \$4.25.

This atlas is the second in a series of several radiographic standards of reference for skeletal maturation, based on studies of human growth and development. The studies were begun by the late T. Wingate Todd and were a project of the Brush Foundation and the Western Reserve School of Medicine, Cleveland, Ohio. Several thousand children were studied. The first atlas in the present series was the *Radiographic Atlas of Skeletal Development of the Hand and Wrist*, by Greulich and Pyle.

There are several preliminary chapters describing how the plates were selected so that one series of standard plates is equally applicable for a boy or a girl. The principal part of the atlas consists of 29 reproductions of films of healthy children from birth to age 18. Key osseous features illustrating the current stage of development at a designated skeletal age are described and labeled on each plate. The authors point out that by standardizing these osseous features of the knee according to a moderate rate of skeletal development, either a fast rate or a slow rate of osseous development of the knee is thereby automatically indicated.

The text is well written and the reproductions are excellent. The atlas should be of considerable interest to radiologists, pediatricians, and investigators interested in a standard of reference for the maturation of the knee joint.—*JOHN L. HATCH, Capt., MC, USN*

**FUNCTIONAL OTOTOLOGY, The Practice of Audiology**, by *Morris F. Heller, M. D., with Bernard M. Anderman, M. A., and Ellis E. Singer, M. A.* 225 pages, illustrated. Springer Publishing Co., Inc., New York, N. Y., 1955. Price \$5.50.

The author's description of a sound-treated room and equipment lacks detail that would enable one to set up a hearing testing facility without further information. The chapter on history taking is excellent and reflects the great experience of the author. The explanation of audiometric technic is excellent; descriptions of the technic of special

tests such as recruitment binaural and monaural, loudness balance, and difference limen are given in simplified terms.

The text is well organized and covers the field of audiology from history taking to rehabilitation. Generally speaking, the material is presented simply and is readily understandable. The author's description of the clinical aspects of diagnosis and appraisal of the patient as a whole shows a remarkable insight.

It is felt that this book will have its greatest value for audiometric technicians, audiology students, and physicians who are interested in diagnosis and rehabilitation of the hard of hearing; however, the material has not been covered in enough detail to be used as a reference.—RALPH N. KRAUS, Lt. Col., USAF (MC)

AN INTRODUCTION TO HUMAN ANATOMY, by Clyde Marshall, M. D. 4th edition. Revised by Edgar L. Lazier, Ph. D. 420 pages; 329 illustrations, 15 in color. W. B. Saunders Co., Philadelphia, Pa. 1955.

Although it is nowhere clearly stated, one gains the impression that this book is intended for the arts and science college student. This is the fourth edition in a period of 20 years. According to Dr. Lazier, "the most extensive revision" has been in the treatment of the neurosensory system. The two chapters on this subject constitute almost one fourth of the book.

The illustrations are usually good and are taken in the main from standard textbooks of anatomy. At various points paragraphs entitled "practical considerations" are inserted in the text. Footnotes dealing generally with etymology are liberally interspersed and should be helpful to the novice.

While the order of presentation may vary, the topics covered are conventional. One may again learn the derivation of the various coverings of the testicle acquired during its descent through the abdominal wall. However, there was no mention of the relationship of the inferior epigastric artery to the abdominal inguinal ring. In other sections taken at random, I was surprised to find practically no reference to the coronary arteries and certainly there exists some question as to whether the appropriate way to control venous hemorrhage is by compression on the "distal side."

The physician and the student of any of the sciences closely allied to medicine will find little or no use for this elementary presentation.

—WILLIAM D. TIGERTT, Lt. Col., MC, USA

THE MANAGEMENT OF OBSTETRIC DIFFICULTIES, by Paul Titus, M. D., revised by J. Robert Willson, M. D., M. S. 5th edition. 737 pages; with 348 text illustrations and one color plate. The C. V. Mosby Co., St. Louis, Mo., 1955. Price \$12.50.

The fifth edition of Titus' *Management of Obstetric Difficulties* has been brought up to date in every section and chapter. It is very easy to

read and contains much valuable information of considerable interest to student, practitioner, and specialist alike. Dr. Willson has definitely improved the entire text by including considerable new material and by deleting old, outmoded passages. He has called upon his depth of experience to accomplish this end, and one cannot help but heartily approve of his over-all policy of conservatism, especially when discussing controversial issues.

The first section deals exclusively with the problem of infertility and covers all aspects of diagnosis and treatment now available. The section on complications of labor is especially well presented and contains all the most modern concepts concerning this ever-present problem. The many photographs and drawings go a long way in explaining certain difficult passages in the text.

This is an excellent and timely revision of a classic obstetric text and in my opinion will be of inestimable value as a source of reference to anyone practicing obstetrics.—WILLIAM S. BAKER, Jr., Capt., MC, USN

**THE TREATMENT OF RENAL FAILURE**, Therapeutic Principles in the Management of Acute and Chronic Uremia, by John P. Merrill, M. D. 238 pages; illustrated. Grune & Stratton, Inc., New York, N. Y., 1955. Price \$6.75.

This is a well-written treatise by a recognized authority in the field of renal disease. The discussions of the physiology, pathology, and symptomatology of kidney disease in successive chapters give a particularly clear understanding of the pathogenesis and recognition of renal failure. Detailed management of both acute and chronic kidney disease is presented concisely enough to serve as a ready reference for the case at hand. Finally, treatment of renal failure by extra renal routes (the artificial kidney being the most prominent) is discussed.

After carefully reading this little book the writer was fully convinced that it serves its purpose as a guide to the treatment of renal disease. Those dealing with such problems will undoubtedly agree.

—JOHN B. MacGREGOR, Capt., MC, USN

**REHABILITATION OF A CHILD'S EYES**, by Richard G. Scobee, M. D., F. A. C. S. Revised by Herbert M. Katzin, M. D., F. A. C. S. 2d edition. 133 pages; illustrated. The C. V. Mosby Co., St. Louis, Mo., 1955. Price \$2.85.

This little book of 133 pages is dedicated to the memory of Dr. Richard G. Scobee, a recognized authority in the field of extraocular muscles, who wrote the first edition appearing in 1949. Dr. Scobee died in 1952, and Dr. Herbert M. Katzin has revised and brought the book up to date, adding several illustrations.

The worried parents of the squinting child have many questions to ask. Why do the child's eyes deviate? Are the parents responsible for the condition? Will the child outgrow it? What is the effect of crossed

eyes on the child's personality? What is the proper treatment and when should it begin? What is the role of glasses and may they be discarded after operation? This book answers these and many more questions in terms which the layman can comprehend.

Simple illustrations are used to explain accommodation, fusion, suppression, the accommodation-convergence relationship, the various refractive errors, the types of squint, operative procedures, et cetera. A glossary is appended to explain the terms used.

Although this book is written primarily for the parents, it should be of particular interest also to physicians, other than those dealing with diseases and surgery of the eyes, who are in need of information which will enable them to give sound advice on the subject when consulted by the parents of the cross-eyed child. Certainly, every ophthalmologist doing extra-ocular muscle surgery would do well to have copies available for loan to parents.—KARL J. PALMBERG, *Capt., MC, USN*

THE BACK AND ITS DISK SYNDROMES, Including Injuries, Diseases, Deformities and Disabilities, with Notes on The Pelvis and Coccyx, by *Philip Lewin, M. D., F. A. C. S., F. I. C. S.* 2d edition, thoroughly revised. 942 pages; 371 illustrations and 4 color plates. Line drawings by *Harold Laufman, M. D.* Lea & Febiger, Philadelphia, Pa., 1955. Price \$18.50.

The author has changed the title of this second edition from the earlier "Backache and Sciatic Neuritis" in order to emphasize the importance of intervertebral disk lesions among the causes of low back pain and sciatica. The book is encyclopedic in its presentation of the numerous and varied conditions which may give rise to backache with or without radiation of pain to the extremities.

The immensity of the subject is adequate reason for any fault in continuity and organization which may be apparent. There is considerable repetition, and the book could readily be condensed with no loss of context. Indeed there are some subjects, such as treatment of burns of the back and detailed operative procedures for leg equalization, that have questionable bearing on the title subject.

There can be little criticism of the material, which is for the most part clearly presented. Those seeking a ready reference for the diagnosis and treatment of back disorders, especially the conservative management, will find it in this comprehensive volume. It is rather a pity, however, that many old concepts such as "railway spine," "Kummel's syndrome," and the importance of congenital lumbosacral anomalies in the etiology of low back pain have been retained in this edition. It is also unfortunate that the author recommends primary closure of back wounds sustained under conditions of warfare, provided they are treated early and properly débrided. This does not conform to the existing military policy of delayed wound closure and might be a source of confusion to those called upon to perform emergency operations in the field.

—ERNEST A. BRAV, *Col., MC, USA*



**CLINICAL ROENTGENOLOGY, Volume III, The Lungs and the Cardiovascular System Emphasizing Differential Considerations**, by *Alfred A. deLorimier, M. D., Henry G. Moehring, M. D., and John R. Hannan, M. D.* 512 pages; 760 illustrations (5 in color). Charles C Thomas, Publisher, Springfield, Ill., 1955. Price \$20.50.

This, the third of four volumes of "Clinical Roentgenology," concerns the thorax and its contents. There are separate sections devoted to mediastinal tumor, congenital malformations of the heart and great vessels, acquired heart disease, cardiac trauma, cardiac failure, tumors and cysts of the heart and pericardium, and pericarditis.

Each section begins with a concise discussion of general, embryologic, anatomic, roentgenologic, and technical considerations. Subdivisions of each section likewise contain introductory paragraphs of pertinent information concerning particular anatomic areas and pathologic conditions. The section on the lung is the largest and it presents the numerous pulmonary and bronchial disorders associated with inflammation, neoplasia, and hazardous occupation. This chapter is particularly well organized and contains a great deal of case material. Other sections are equally well written and the discussion of each subject includes a brief summary of clinical and laboratory data necessary for understanding and diagnosis.

The format is excellent. The illustrations are well chosen and of excellent quality. The table of contents is detailed and complete. The index is excellent and the bibliography adequate.

The great number of illustrations might place the book in the category of an atlas, yet it should prove to be both a text and reference book for the student and the experienced radiologist.

—ELMER A. LODMELL, Col., MC, USA

**NEUROGLIA, Morphology and Function**, by *Paul Glees, M. A., D. Phil., M. D.* American Lecture Series, Publication No. 260, A Monograph in American Lectures in Neurology. Edited by *Charles D. Aring, M. D.* 111 pages; illustrated. Charles C Thomas, Publisher, Springfield, Ill., 1955. Price \$5.

This monograph is a well-organized and well-written presentation of past and present concepts on neuroglia. The author stresses the dynamic aspects of neuroglial function, pointing out that their function may extend beyond the protection, support, and insulation of the neurones, and presents evidence suggesting that neuroglia may have an influence directly related to neuronal metabolism and synaptic activity.

The book includes considerable historical background on the various and successive concepts of the nature and functions of neuroglia that have been held over the past years by various observers. After a short comparative anatomic résumé, the main body of the monograph is concerned with the morphologic and functional studies of neuroglia and their reactions to pathologic and functional conditions. The extensive bibliography of almost 300 references is a valuable compilation of data



animals, and the differences and similarities are clearly enunciated. Various histologic types of tissue are dealt with individually in regard to the method of healing. Photomicrographs illustrate such interesting phenomena as the ameboid extension of epithelial cells to form a membranous covering of the epithelial wound and the infiltrating lymphocytes changing to macrophages in healing of wounds. Schematic drawings are used to demonstrate other features of wound healing.

Basing his discussion on the underlying physiologic and physical factors involved, the author points out how surgical technic may play a deciding role in the effectiveness of healing, and when it is to be considered chiefly primary or secondary. The final chapter presents "a new concept of the basal cells of human epithelium related to carcinoma." It serves to stir the reader's imagination as he reviews the author's concept of the mechanism of wound healing.

This publication is extremely stimulating reading and gives a clear-cut concept of human wound healing and its clinical significance.

—EMMETT F. NORWOOD, Capt., MC, USN

**THE PATHOGENESIS OF POLIOMYELITIS**, by Harold K. Faber, M. D. 157 pages; illustrated. Charles C Thomas, Publisher, Springfield, Ill., 1955. Price \$5.

This book was written to clarify concepts on the basic nature of poliomyelitis. Much of the review is based on experiments conducted by the author and his associates and on a series of papers published since 1940. The author comments that some of his observations are published for the first time in this book.

The publication of this review is particularly timely in view of the recent interest in immunization against poliomyelitis. The perennial controversy as to whether the virus is strictly neurotropic or has affinities for other than nervous tissue is discussed. The author favors the concept of primary neurotropism. The controversy over the portal of entry of the virus is also presented.

The author frequently summarizes his discussions and keeps the reader from getting lost in some of the theoretical discussions. At the end of the book the author reviews his conclusions in a recapitulation of the material. The material is well organized and there is an extensive bibliography. Neurologists, internists, and pediatricians will find this a helpful and up-to-date review of current knowledge and concepts about poliomyelitis.—ROBERT L. WILLIAMS, Maj., USAF (MC)

**A HANDBOOK OF HOSPITAL PSYCHIATRY**, A Practical Guide to Therapy, by Louis Linn, M. D. 560 pages. International Universities Press, Inc., New York, N. Y., 1955. Price \$10.

This volume is not a textbook of administrative psychiatry in the usual sense and has little to do with the logistics of hospital management. Rather, it is a practical, clearly written, absolutely sound and

dynamic exposition of the proper functioning of the human and material elements of the therapeutic community, the center of which is the mental hospital. The book deals with such matters as individual and group therapy in a mental hospital setting and the place, function, and inter-relations of the psychiatrist, psychologist, social worker, nurse, chaplain, recreational and occupational worker, and even the dietitians and the volunteer worker. It contains excellent discussions of the influence of hospital architecture and décor, administrative procedures, staff education, outpatient and family care, and the role of the patient's relatives and his community in forwarding the over-all objective of patient rehabilitation.

One theme of this valuable book is the necessity for an *integrated*, holistic approach to the goal of effective treatment in which every aspect of the hospital organization is essentially participant. One of the larger values of this book is the broad, informed picture it affords for *all* members of a hospital organization of the desirable methods and functions of the individual units and ancillary services that comprise their institution. In addition, this is a handy reference book containing a wealth of practical information of particular interest to the hospital psychiatrist concerning such matters as the special problem of the addict, the criminal insane, forensic psychiatry, the sexual deviate, clinical statistics, and hospital research problems. The excellent bibliography includes a brief précis of the content and approach of each reference cited.—CHARLES S. MULLIN, Capt., MC, USN

**HYPNOTIC SUGGESTION, Its Role in Psychoneurotic and Psychosomatic Disorders.** A Thesis, by S. J. Van Pelt, M. B. 95 pages; illustrated. Philosophical Library, New York, N. Y., 1956. Price \$2.75.

This book, written by the President of the British Society of Medical Hypnotists, is short, concise, and so well written that even a non-medical reader could understand the subject of hypnosis after spending a few hours with the book.

The author refers to this work as a thesis. In this thesis he gives a short historical outline of hypnotism, the nature of the hypnotic state, and methods of inducing hypnosis. He rightfully denounces the demonstration of hypotism on the stage.

In this thesis the author claims originality for three findings. The first is that hypnotism is a concentration of the mind. He explains this well, states that a light hypnotic state may be obtained in 95 per cent of people. The second original theory is that hypnotic suggestion plays a role in the etiology of psychoneurosis. He states that by hypnotic suggestion a normal person may develop a condition indistinguishable from a genuine psychoneurosis. The third finding is an original method of treating psychoneurosis by hypnosis in a few visits. In the first visit a history is taken, in the second an explanation of what is to be accomplished is given to the patient, and light hypnotic sleep is in-

duced. In the third visit he again is placed in a light sleep, then informed that within a week a thought will enter his head which will show him why he first became frightened. The author states that invariably during the week the thought will appear and at the fourth session the patient will relate the incident which is the cause of his illness. The explanation for his illness is then imparted to him. The actual number of visits required may be four or, in difficult cases, as many as 12. The treatment consists of relaxation, realization, and re-education, and 12 case histories are presented.

—FRANCES L. WILLOUGHBY, *Comdr., MC, USN*

EXPERIMENTAL PSYCHOLOGY, A Series of Broadcast Talks on Recent Research, by A. J. Watson, Harry Kay, J. A. Deutsch, B. S. Farrell, Michael Argyle, and R. C. Oldfield. Edited by B. A. Farrell. 66 pages. Philosophical Library, New York, N. Y., 1955. Price \$2.75.

An American reader accustomed to the scholarly, critical, detailed reporting of experimental psychology such as that done by Woodworth or Stevens is apt to respond with disappointment to this book. The subtitle is misleading and might better be something to the effect of "brief discussions of selected research from selected areas of psychological research."

As indicated by the subtitle, the contents consist of six radio addresses delivered over the British Broadcasting System. The areas from which the talks are chosen include perception, adult learning and memory, motivation, some psychoanalytic hypotheses, and social behavior. The concluding address attempts to set forth some of the problems confronting researchers in the psychology of behavior, including potential lay reactions to their findings.

Although the volume does not merit the title "experimental psychology" and is not likely to attract the attention of the lay audience for whom it was apparently intended, its initial objective—the promotion of a better understanding of what psychologists are interested in and how their objectives are achieved—merits approval. American psychologists might well consider similar programs.

—JAMES W. LAYMAN, *Maj., MSC, USA*

UNDERSTANDING PEOPLE IN DISTRESS, Emotional and Mental Disorders, Their Cause, Care, and Cure, by Barney Katz, Clinical Psychologist, and Louis P. Thorpe, Professor of Psychology. 357 pages. The Ronald Press Co., New York, N. Y., 1955. Price \$4.

The purpose of this introduction to neuropsychiatric problems is to explain the cause, care, and cure of mental and emotional disorders in simple language and for reading by the average man. Nevertheless, professional workers in the field of human maladjustment will find the volume useful for rapid review and occasional reference in matters of psychopathology. The writers perform an exacting job in intelligible and thorough fashion.

The approach is chiefly of the psychoanalytic order. However, the authors are inclined to ascribe the causation of practically all emotional disorders to early acquired feelings of insecurity and inadequacy on the part of the sufferer. They present the entire gamut of neurologic and psychiatric problems in tabloid style, illuminated by short, typical case histories. One would like to know more about the technic of psychotherapy pursued by the authors, as their case histories all eventuate in "cure" or great relief.

As to be expected with a popular work on psychiatry, their pronouncements are often dogmatic and sometimes questionable. For instance, they hold that only Huntington's chorea has been accepted by scientists as a hereditary mental disorder. They neglected to mention, for example, amaurotic familial idiocy or phenylpyruvic oligophrenia. Again, they state, "The secure person is one who has received as a child complete, continuous, and unqualified acceptance by his parents." But many early orphans have no doubt grown up into secure and happy adults by virtue of other felicitous interpersonal experiences.

The format is handy and the type readable. A selected bibliography and concise index enhance the utility of the volume.

—ARTHUR J. ORANGE, Lt. Col., MSC, USA

AN ELEMENTARY TEXTBOOK OF PSYCHOANALYSIS, by *Charles Brenner*, M. D. 219 pages. International Universities Press, Inc., New York, N. Y., 1955. Price \$4.

In psychiatry the yearly yield of books and papers is overwhelming, and the plethora has tended to be increased by the publication of reviews, annuals, surveys, and yearbooks as well as volumes presenting an outline of, the foundations of, the essentials of, a synopsis of, the fundamentals of, or the introduction to a particular area of psychiatry or a related field. At first glance it appeared that this book was another in the last category. A reading proves otherwise. It is not a résumé for psychiatrists or trained professional workers in related fields. In his introduction the author sets himself a goal in keeping with the title. This is to be an elementary textbook setting forth the fundamentals of psychoanalytic theory and providing an introduction to the literature of psychoanalysis for the physician, the psychiatrist, the psychologist, and the social worker. This the book proposes to do without demanding from the reader a previous psychoanalytic knowledge.

Dr. Brenner has admirably reached his goal. In eight chapters and only 199 actual pages of text, he has presented the core of basic psychoanalytic theory and fact with striking clarity. Many excellent clinical examples illustrate these principles, and where the use of unfamiliar psychoanalytic terms is necessary, great pains are taken to assure the reader's understanding. At the same time a historical sketch of the development of Freud's basic concepts and the changes and refinements in those concepts as they took place is woven into the presentation. Changes in the meaning of terms that took place as concepts were

altered are also marked out for the reader's guidance. Each chapter is supplemented by suggested references for further reading. An alphabetical reference list is included at the end of the book, as is a very adequate index.

Dr. Brenner has turned out a factual, clear, concise presentation of basic modern psychoanalytic thought. It is well named. It is a textbook. As such it is unique, and it will, no doubt, fill a very definite need in the training of medical students, interns, psychiatric residents, and psychoanalytic candidates as well as students of allied fields. It may also become a classic in the field of teaching the teacher how to make extremely technical and complicated material as clear and concise as possible without loss of substance. —ROBERT E. SWITZER, *Comdr., MC, USN*

ATOPIC DERMATITIS, edited by Rudolf L. Baer, M. D. 112 pages; illustrated. J. B. Lippincott Co., Philadelphia, Pa., 1955. Price \$2.50.

This is a small text the purpose of which, as stated by the editor, is to provide "comprehensive information on the many facets of this very important skin disease." Material was previously published in the *American Practitioner and Digest of Treatment* for July 1955. It traces the development of the concept of atopic dermatitis, its clinical appearance, and the confusion existing in its histologic picture. Sulzberger points out that it is responsible for 3 to 5 per cent of all discharges from the service for disease.

Pictures and charts are presented to illustrate the infantile, the childhood, the adolescent, and young adult phases of the condition and its differential diagnosis. Kierland discusses certain stigmata associated with the disease and Rostenberg explores the theories concerning its pathogenesis. Management of atopic dermatitis is presented by Sternberg and Newcomer. Nothing is offered in this section that is not common knowledge.

Of interest are the following points: (1) The sweat retention syndrome is important as an etiologic factor. (2) Benefit is frequently derived from a change of environment. (3) None of the cardinal features of the disease are altered by any psychiatric approach. (4) The opinion of Sulzberger that the so-called typical personality of the affected individual is a result of the disease rather than a contributing factor of the condition is discussed. (5) It is implied that the higher brain centers or the adenal medulla are involved in the abnormal responses of the skin, and that research involving the autonomous nervous system and the higher brain centers is indicated to locate the true pathogenesis of atopic dermatitis. (6) The concept is presented that first there must be a suitable soil in a diathetic individual. Scratching of the skin in such a person leads to the cutaneous lesions.

It is possible that this small book may prove very worthwhile. It is questionable, however that a book should be published on every important dermatologic condition. With the growth and development of

dermatology the field is now big enough to warrant a textbook of dermatology with truly multiple authorship or even an encyclopedia of dermatology rather than a multitude of separate books.

—WILLIAM N. NEW, *Capt., MC, USN*

THE BLOOD-BRAIN BARRIER, With Special Regard to the Use of Radioactive Isotopes, by *Louis Bakay, M. D., F. A. C. S.* 154 pages; illustrated. Charles C Thomas, Publisher, Springfield, Ill., 1956. Price \$5.50.

This monograph on the blood-brain barrier is a complete treatise on the subject, starting with its historical background, the possible anatomic locations of the blood-brain barrier, and its physiology and development. The author discusses his experiments with various radioactive isotopes, especially radioactive phosphate and its relation to the blood-brain barrier. The artificial changes in the permeability of the blood-brain barrier by such means as brain trauma, cerebral infection, toxins, x-ray radiation, allergic agents, cerebral embolism, thrombosis, hemorrhage, and contrast medium used in carotid arteriography are amply discussed.

A large section of the book is devoted to the difference in the uptake of radioactive isotopes by various cerebral tumors in contrast to the normal brain. This difference has been an aid in the localization of these tumors both before and at operation. The reviewer believes that a chapter on the permeability of the blood-brain barrier in the normal and infected brain to the various antibiotics and sulfa drugs commonly in use would increase its attractiveness to clinicians.

The book is concise, well written, and easy to read, and it has an extensive bibliography. It will be of interest mainly to neurosurgeons, neurologists, clinicians, and research workers who deal with brain metabolism.—WILLIAM J. JAMES, *Capt., MC, USN*

PUBLIC RELATIONS FOR THE PHARMACIST, by *William H. Hull, M. A.* 132 pages; illustrated. J. B. Lippincott Co., Philadelphia, Pa., 1955. Price \$4.50.

This book, written in an entertaining and highly readable fashion, is well organized and simply presented. For the pharmacist in civilian life it offers an explicit, workable public relations program. For the pharmacist in military service it offers little that he can apply to his everyday work.

Of all the sections, the one dealing with "Two of Pharmacy's Problems" is by far the most interesting because it discusses freely and frankly the problem which the pharmacist faces when the physicians who serve the people in his community are "dispensers" rather than "prescribers." This section also discusses frankly the ethics involved in any doctor-pharmacist relationship and suggests the means whereby both parties may retain their self-respect while working together to serve their community.



Although the book is both easy and fast reading, it contributes nothing new to the public relations field. General principles, however, are simply illustrated, so that even a specialist in the field can profit from the author's well-organized presentation. It is unfortunate that the text's references to certain illustrative "figures" in the book require that the reader must turn the pages back or forth frequently. Despite this shortcoming, however, it should prove of great value to the civilian pharmacist.—WILLIAM L. AUSTIN, *Major, MSC, USA*

WORLD-ATLAS OF EPIDEMIC DISEASES, Part II, Second and Third Issues, edited by Professor Dr. med Ernst Rodenwaldt, under the Sponsorship of the Heidelberger Akademie Der Wissenschaften. Second issue, 38 pages; 10 colored maps. Third issue, 42 pages; 9 maps. Falk-Verlag, Hamburg 1, Germany, 1954. Price 57.50 Deutsche marks, each issue, plus extra charge for postage and packing.

The fine world-over epidemiologic studies of diseases continue to be produced with remarkable regularity. Each issue contains a number of diseases with statistic and clinical descriptions in English and German, and maps which are the hallmarks of this publication. The pages are not serially numbered but are designed to fit into the loose-leaf system begun in the original publication. The disease entities and maps contained in the second and third issues of volume 2 are listed. The second issue includes: paratyphoid A in Europe, diphtheria in Central Europe, diphtheria in Europe, dengue in the Mediterranean, yellow fever in Africa, trench fever in Europe, leishmaniasis in Africa, filariasis in Africa, distribution of population in the Mediterranean, and distribution of population in Africa. The third issue includes: scarlet fever, morbidity (world); scarlet fever, lethality (world); plague in Europe; plague in Africa; tularemia in Central Europe; louse-borne relapsing fever (world); tick-borne relapsing fever (world); Q fever in Europe; amebic dysentery (world); and ascariasis (world).

Due to availability of official Japanese government health statistics, the rates for the various diseases in Japan were reviewed. There were only minor variations from the maps noted; for example, scarlet fever morbidity indicated a lower morbidity for the years 1919 through 1953 than the rates indicated for the Japanese Islands on the World-Atlas map. The text clearly presents the difficulties in using statistics for the preparations of world maps because of variations in criteria for diagnosis, clinical changes in severity, and the purely mechanical classification systems in use in various countries.

For the epidemiologic student and expert alike, the detailed work and faithful, accurate mapping will make a most complete and authoritative reference. The publishing of the next part will be eagerly awaited by public health physicians and medical libraries throughout the world.—GOTTLIEB L. ORTH, *Colonel, MC, USA*

## New Books Received

Books received by the *U. S. Armed Forces Medical Journal* are acknowledged in this department. Those of greatest interest will be selected for review in a later issue.

- PULMONARY CARCINOMA**, Pathogenesis, Diagnosis, and Treatment, edited by *Edgar Mayer*, M. D., and *Herbert C. Maier*, M. D., 18 contributors. 540 pages; 213 figures; 4 plates in color. Published by New York University Press, New York, N. Y., 1956. Distributed by J. B. Lippincott Co., Philadelphia, Pa. Price \$15.
- BING'S LOCAL DIAGNOSIS IN NEUROLOGICAL DISEASES**, by *Webb Haymaker*, M. D., with chapters by *Richard G. Berry*, M. D., *Bernard S. Epstein*, M. D., and *Paul I. Yakovlev*, M. D. Translated, revised, and enlarged from the 14th German edition. 478 pages; 225 illustrations, including 9 in color. The C. V. Mosby Co., St. Louis, Mo., 1956. Price \$16.75.
- CULTURE AND MENTAL DISORDERS**, by *Ralph Linton*. Edited by *George Devereux*. 139 pages. Charles C Thomas, Publisher, Springfield, Ill., 1956. Price \$4.50.
- COLLAGEN DISEASES** Including Systemic Lupus Erythematosus, Polyarteritis, Dermatomyositis, Systemic Scleroderma, Thrombotic Thrombocytopenic Purpura, by *John H. Talbott*, M. D., and *R. Moleris Ferrandis*, M. D. 232 pages; 30 figures; 16 plates in color. Grune & Stratton, Inc., New York, N. Y., 1956. Price \$6.50.
- HEALTH OBSERVATION OF SCHOOL CHILDREN**, A Guide for Helping Teachers and Others to Observe and Understand the School Child in Health and Illness, by *George M. Wheatley*, M. D., M. P. H., and *Grace T. Hallock*. Illustrations by *Barbara Pfeiffer*. 2d edition. 488 pages; illustrated. The Blakiston Division, McGraw-Hill Book Co., Inc., New York, N. Y., 1956. Price \$6.50.
- THE LEGACY OF SIGMUND FREUD**, by *Jacob A. Arlow*, M. D. 96 pages. International Universities Press, Inc., New York, N. Y., 1956. Price \$2.
- THE YEAR BOOK OF NEUROLOGY, PSYCHIATRY AND NEUROSURGERY** (1955-1956 Year Book Series). Neurology, edited by *Roland P. Mackay*, M. D. Psychiatry, edited by *S. Bernard Wortis*, M. D. Neurosurgery, edited by *Percival Bailey*, M. D., and *Oscar Sugar*, M. D. 576 pages; illustrated. The Year Book Publishers, Inc., Chicago, Ill., 1956. Price \$7.
- ADRENAL FUNCTION IN INFANTS AND CHILDREN**, A Symposium, edited by *Lytt I. Gardner*, M. D. 221 pages; illustrated. Grune & Stratton, Inc., New York, N. Y., 1956. Price \$6.75.
- DYNAMICS OF PSYCHOTHERAPY**, The Psychology of Personality Change. Volume I, Principles, by *Percival M. Symonds*, Ph. D. 210 pages. Grune & Stratton, Inc., New York, N. Y., 1956. Price \$5.50.
- LAUGHTER AND THE SENSE OF HUMOR**, by *Edmund Bergler*, M. D. 297 pages. Intercontinental Medical Book Corp., New York, N. Y., 1956, in cooperation with Grune & Stratton, Inc., New York, N. Y. Price \$5.

**TUMORS OF THE SKIN**, by *Herbert Conway*, M. S., M. B., M. D., American Lecture Series, Publication No. 270, A Monograph in The Bannerstone Division of American Lectures in Surgery, edited by *Michael E. DeBakey*, M. D., and *R. Glen Spurling*, M. D. Plastic Surgery Division, edited by *James Barrett Brown*, M. D. 267 pages; 178 figures; 3 plates in color. Charles C Thomas, Publisher, Springfield, Ill., 1956. Price \$13.50.

**ANGIOCARDIOGRAPHIC INTERPRETATION IN CONGENITAL HEART DISEASE**, by *Herbert L. Abrams*, M. D., and *Henry S. Kaplan*, M. D. American Lecture Series, Publication No. 279, A Monograph in The Bannerstone Division of American Lectures in Pediatrics, edited by *John A. Anderson*, M. D. 233 pages; illustrated. Charles C Thomas, Publisher, Springfield, Ill., 1956. Price \$11.75.

**CONTEMPORARY PSYCHOTHERAPISTS EXAMINE THEMSELVES**, An Evaluation of Facts and Values Based Upon Guided Interviews with Forty-three Representatives of Various Schools, by *Werner Wolff*, Ph. D. American Lecture Series, Publication No. 264, A Monograph in The Bannerstone Division of American Lectures in Psychology, edited by *Molly Harrower*, Ph. D. 300 pages. Charles C Thomas, Publisher, Springfield, Ill., 1956. Price \$6.75.

**THE YEARBOOK OF MODERN NURSING 1956**, A Source Book of Nursing, edited by *M. Cordelia Cowan*. Foreword by *Mary M. Roberts*. 446 pages. G. P. Putnam's Sons, New York, N. Y., 1956.

**AN INTRODUCTION TO PACK TRANSPORT AND PACK ARTILLERY**, The Role of the Mule—Past and Present—in War and Peace, by *Michael F. Parrino*, Major, Artillery, USAR. 155 pages; illustrated. Queensland Publishing Co., New York, N. Y., 1956. Price \$5.50.

**CAMPBELL'S OPERATIVE ORTHOPAEDICS**, Volumes One and Two, by *J. S. Speed*, M. D., and *Robert A. Knight*, M. D. 3d edition. Volume I, Chapters I to XIII, pages 1-1104. Volume II, Chapters XIV to XXVI, pages 1105-2124. 1,323 illustrations including two color plates. The C. V. Mosby Co., St. Louis, Mo., 1956. Price \$40.00 for two volumes.

**MANAGEMENT OF STROKES**, by *Keith W. Sheldon*, M. D. 134 pages; illustrated. J. B. Lippincott Co., Philadelphia, Pa., 1956. Price \$3.

**ANKYLOSING SPONDYLITIS**, Clinical Considerations, Roentgenology, Pathology Anatomy, Treatment, by *J. Forestier*, M. D.; *F. Jacqueline*, M. D.; and *J. Rotes-Querol*, M. D. Translated by *A. U. Desjardins*, M. S., M. D. 374 pages; illustrated. Charles C Thomas, Publisher, Springfield, Ill., 1956. Price \$10.75.

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# Monthly Message

## Alaska

At the beginning of World War II there were only one or two small military establishments in Alaska and the total population was only 39,000; now it is approximately 200,000 and we have very large military establishment under the unified Alaskan Command, with headquarters in Anchorage. The Army and Air Force headquarters are at Fort Richardson and Elmendorf Air Force Base respectively, and the Alaskan Sea Frontier is based on Kodiak Island, some 200 miles to the southwest. The whole Command is active, constantly on the alert, and with high morale and there are extensive airfields and warehouses, modern barracks and housing developments, and Arctic research and testing laboratories, as well as our early warning systems.

The United States purchased Alaska from Russia in 1867, but it required a world war to awaken us to the full extent of its potentialities. Although prehistoric races from Siberia landed on Seward Peninsula perhaps 25,000 years ago, modern colonization began in 1784 with Grigor Sholekhov, who traveled a similar route in sailing ships. In 1788 Alexander Baranov established a permanent colony on Kodiak Island with a small group of hard PROMESHLENNIKI, or explorers. His explorations and fur trading extended all the way to northern California. He founded the old Russian capital at Sitka, which was completely destroyed by the Indians, but which was rebuilt again by him the following year and is still an active town of over 2,000 inhabitants.

*Frank B. Berry*  
FRANK B. BERRY, M. D.  
Assistant Secretary of Defense  
(Health and Medical)

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## Foreword

The *United States Armed Forces Medical Journal* is the medium for disseminating information of administrative and professional interest to all medical personnel of the Department of Defense. The Assistant Secretary of Defense (Health and Medical) and the Surgeons General of the several services invite all medical officers, dental officers, Medical Service Corps officers, Nurse Corps officers, and officers of the Veterinary Corps of the Armed Forces, and the medical consultants of the Army, Navy, and Air Force to submit manuscripts for publication in this journal.

FRANK B. BERRY, M. D.,  
*Assistant Secretary of Defense (Health and Medical)*

MAJOR GENERAL SILAS B. HAYS,  
*Surgeon General, United States Army.*

REAR ADMIRAL BARTHOLOMEW F. HOGAN,  
*Surgeon General, United States Navy.*

MAJOR GENERAL DAN C. OGLE,  
*Surgeon General, United States Air Force.*

# UNITED STATES ARMED FORCES MEDICAL JOURNAL

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## EXPERIENCES WITH A TRAUMA WARD

A Report on the First Six Months of Operation

GEORGE L. BEATTY, *Colonel, MC, USA*  
EDWIN J. PULASKI, *Lieutenant Colonel, MC, USA*

**M**OST EXPERIENCED surgeons are of the opinion that the patient with acute trauma receives less expert care, particularly during the early phase of treatment, than do other patients on surgical wards. Of the many reasons that may account for this, certain ones are readily apparent. Not infrequently there is less interest in trauma than in other aspects of surgery, and disproportionately less teaching of the subject to medical students and young doctors. Often there are certain administrative hospital routines and practices which are not in harmony with the best interests of the injured patient.

Surgeons, especially those in an older age group who are best qualified to care for injured patients, are so often occupied with full-time schedules that they do not find the time, energy, or interest to devote to traumatology. The younger surgeon, focusing primarily on elective surgical procedures, is less attracted toward the accident patient, whose condition, time of arrival, and time required for initial definitive treatment are unpredictable. Due to awareness of these deficiencies, recently some medical schools have, as a result of the MEND (Medical Education for National Defense) program, added to their curricula the subject of trauma. Prior to this, medical students had little or no opportunity to acquire academic knowledge or clinical experience in this field. Similarly, there was lack of opportunity for the recent medical school graduate to acquire formal knowledge and skill in the management of acutely injured patients during internship. There are a number of hospitals having accredited residencies in general surgery which do not accept accident cases. In many other residency training programs trauma is given a subordinate role.



Because of the fact that trauma is a daily concern, training in this field should be a part of the background of every general surgeon.

Most hospitals have fairly uniform and established routines for admitting nontraumatic cases. The patient with a contagious disease, for example, is admitted to a contagion ward; the patient with injury of the eye only is admitted to a ward designated for eye patients. Certain trauma cases, however, particularly those with multiple injuries, may be admitted at random to any of a number of surgical wards, where the results of treatment may vary from good to poor, depending on the interest or experience of the individual ward officer. The efficiency of consultants from other surgical subspecialties is compromised when these specialists are required to go from ward to ward and try to maintain liaison with a number of different ward surgeons. The difficulties of establishing priorities for treatment and assigning responsibility for the over-all care of the patient are thereby increased. This diffusion of patients in a number of wards makes the study of their lesions not only a matter of inconvenience but tends to promote the disinterest of the staff.

Realization of these problems led us to the concept that formal training in traumatology should be a part of a general surgical residency program and that this training should be continuous throughout the period of residency. In order to make this as effective as possible, the one basic requirement seemed to be the establishment of a trauma ward, wherein certain acutely injured patients could be concentrated for care, study, and teaching. By this device it was hoped that greater interest in the subject would be elicited, and the care given to the injured patient improved.

The medical officers in our department agreed that the end results of treatment of acute injury cases could be improved. The subject was discussed in detail. It occurred to several of them that establishment of a trauma ward would help to overcome many of the problems we had observed heretofore in the care of injured patients scattered throughout our surgical wards. The idea was not new. Several officers recalled their experiences in the field during the recent wars and in previous peacetime assignments where they had observed trauma wards used more for convenience than for teaching. There was general agreement that better over-all control of injured patients could be maintained if they were housed in one ward, with particular emphasis on resuscitation, optimal and continuous care from admission to discharge, uniform pattern of management, and careful evaluation of end results. Administratively the matter of public relations would be simplified.

## SIZE AND LOCATION OF TRAUMA WARD

A trauma ward was therefore established at this hospital on 1 July 1955. No changes or additions in its basic structure were required. No expense was involved. The ward chosen was located on the third floor, which housed the operating suite and the general surgical wards. It was easily accessible by elevator from the receiving office which was on the first floor. The entrance to the ward was only a few paces from the operating suite. Its proximity to the operating room was an important feature. The ward accommodated 35 beds. Four cubicles contained five beds each; five small rooms had two beds each, and one larger room had five beds. Just inside the entrance to the ward was a room with four beds, used for patients admitted in shock. It was not a part of the plan to have a ward just this size. It might have been larger or even smaller and still have been useful for this purpose. Its location near the operating rooms and the fact that it contained a number of smaller rooms, thus providing privacy and protection of burned patients from drafts, were deciding considerations in its selection.

## ADMISSIONS TO TRAUMA WARD

The majority of patients admitted were classified as general surgical or neurosurgical. These two groups included those who had incurred some type of injury of the soft tissues, with or without head injury and with or without fractures. For this reason there was a definite advantage in having patients with soft-tissue trauma and with neurosurgical injuries on the same ward. Thus, 20 per cent of all admissions to this ward fell into this category. Three hundred and sixty-eight patients were admitted during the six-month period covered by this report, an average of 61 admissions per month. They were classified as follows: 186, general surgical; 160, neurosurgical; 16, thoracic surgical; 1, gastrointestinal; 1, vascular; and 4, miscellaneous.

Table 1 lists the 430 recorded diagnoses for the 368 patients, many of whom had multiple injuries. For the six-month period covered by this report, the patients admitted to the trauma ward comprised 27 per cent of all hospitalized injury cases and 7 per cent of all patients admitted to the department of surgery for the same period.

## ADMISSION OF TRAUMA PATIENTS TO OTHER WARDS

Not all injured patients were admitted to the trauma ward. Children up to 12 years of age and women were admitted to the trauma ward only if they were unconscious or in shock; otherwise, they were admitted to their respective wards. Patients with single injuries that clearly placed them in a special category were admitted to specialized wards; for example, those with injuries of

the eye were admitted to the eye, ear, nose, and throat ward; fracture patients with no associated injury were admitted directly to an orthopedic ward.

### PERSONNEL

One medical officer in his first year of general surgical residency was assigned as ward officer. One intern was assigned as assistant ward officer. The neurosurgeon of the hospital staff, whose office and clinic were located on this ward, supervised the management of patients with neurosurgical trauma. The overall management of the ward was supervised by the fourth year general surgical resident and the chief of the general surgical service. The normal complement of nurses and enlisted and civilian attendants for a ward of this size was assigned and was augmented as necessary.

TABLE 1. *Classified diagnoses in 368 trauma patients*

Diagnoses	Number
Contusions and abrasions	56
Lacerations:	
Head	49
Upper extremity	39
Thorax	10
Lower extremity	30
Amputations (digits)	16
Penetrating wounds:	
Stab	14
Gunshot	17
Foreign body	4
Bites (human and animal)	5
Burns (thermal, electrical, chemical)	27
Unconsciousness:	
Brain concussions	76
Brain contusions	5
Alcohol, intoxication	18
Peripheral nerve injuries	10
Fractures:	
Skull and facial bones	17
Thorax or vertebrae	8
Extremities	14
Sprains	11
Dislocations	4
Total	430

## SHOCK ROOM

Certain supplies and items of equipment, in addition to those found on any surgical ward, were provided in the shock room for emergency use. These included inhalation anesthesia and oxygen apparatus, mouth gag, tourniquet, intravenous fluids including plasma volume expanders, emergency sterile operating linen packs, antidotes for poisons, restraints, splints, traction apparatus, portable x-ray apparatus, complex suture set, lumbar puncture set, catheterization tray, tracheotomy set, and suction apparatus.

## GENERAL OPERATION OF THE TRAUMA WARD

Those patients who were in shock on admission were kept in the shock room and given the necessary resuscitative treatment. When vital signs were stabilized and the patient's condition permitted, he was moved from the shock room to a private room or to a bed in the open ward. It was part of the original plan that the patients would remain in the trauma ward during their period of definitive treatment. This period of treatment might vary from a few days to two or more weeks. The number of new patients that the ward could accommodate each month was determined by the length of time the patients remained on the ward. The 368 acutely injured patients admitted during the six-month period remained in the trauma ward for an average of 12 days. When a patient had recovered from his injuries, he was discharged to duty. If he was still unable to perform full military duty, he was transferred to a convalescent ward, but continued in the charge of the ward surgeon of the trauma ward. If all the beds in the trauma ward were occupied, vacant beds were made available for new admissions by transferring to convalescent wards those patients who required the least amount of active treatment. By this means the capacity of the trauma ward was readily adjustable to the number of patients who required treatment in this ward. The ward operated consistently at or near its capacity during the period covered by this report.

The patient with multiple injuries often required the attention of an ophthalmologist, an orthopedist, or other specialist. The specialist continued to treat the patient until he had recovered. If the patient recovered first from his general injuries but needed further treatment by a specialist, he was transferred to the appropriate ward. The ward surgeon of the trauma ward was encouraged to make full use of the consultants of other services and to maintain close liaison with them on every case. By this means the ward surgeon gained considerable experience in trauma of the various surgical subspecialties. It was often possible for the ward surgeon to relieve the specialist of routine duties. The ward surgeon thus was able to expand his knowledge and skill in the over-all care of injured patients.

## DISCUSSION

The advantages of the trauma ward became apparent soon after it was functioning. Especially noteworthy was the intense interest in trauma aroused in the intern and resident staff. Several officers remarked that the teaching ward rounds enabled them to harmonize their ideas with what they had learned in medical school and elsewhere, to put to practical use their newly implemented knowledge. There was a greater tendency on the part of the younger officers to determine existing policy and proper treatment before improvising regimens about which there was some doubt. The mere existence of the trauma ward made them conscious of the wrong and right methods of handling acutely injured patients. There was a notable improvement in the care given to the injured patients coming to the hospital, especially during the night.

It is believed that a trauma ward is best operated by a general surgical service. Such an arrangement affords all officers on the service an opportunity to acquire first-hand experience in traumatology. This training is initiated during their first year of the residency, during which time three months are spent on the trauma ward. Throughout the entire four years of the residency each trainee serves as a member of an emergency surgical team. Such teams are composed of two interns and two residents in their second and third years of training, as well as assigned staff members. In effect, trauma is taught and practiced throughout the tenure of the residency period.

Whereas there has been no attempt to train medical officers to be "accident specialists" in the sense of an assignment, we are endeavoring to graduate the surgical resident with a firm foundation in the care of the acutely injured patient. Emphasis has been placed on the care of the wound throughout the entire period of healing and restoration of function. Complications of wound healing are studied closely and the means of prevention are constantly being sought. Prevention of infection and other factors which delay wound healing are stressed. The trauma ward provides the workshop for the fabrication of these principles.

Gissane<sup>1</sup> has pointed out that when an injured patient is first seen he suffers only the result of his injury. If it is possible, immediate treatment with a view to achieving a definite functional result should be instituted before infection, postural deformity, and other complications have occurred. He stated that accident surgery is the acute phase of both plastic and orthopedic surgery. At our hospital the majority of the accident cases are cared for by general surgical residents who also receive several months' training in orthopedics. In the process of their training they also acquire knowledge of the basic plastic surgical procedures. The young general surgeon soon acquires the ability to cope with most of the problems seen in the trauma ward. He is encouraged

to maintain close liaison with other services which will be concerned not only with the emergency but also with the later special treatment. The officers of the various surgical subspecialties are intimately concerned with the trauma ward when their services are required. Without them the team effect and much valuable training are lost. Military hospitals with a representation of such assigned specialists are thus easily adaptable to the establishment and operation of a trauma ward.

The functions of a trauma ward, as brought to light by our experience, may be expressed as follows:

1. *To ensure the prompt and efficient treatment of acutely injured patients.* The admission and segregation of acutely injured patients in a single ward conveniently located near the operating suite facilitates provision of the indicated treatment. Unlike injured patients who are scattered throughout the hospital, the injured patients in a trauma ward are not neglected but are given undivided attention and continuous care by the same group of surgeons. Administrative and professional functions are greatly simplified.

2. *To focus special attention on trauma.* Establishment of a trauma ward has served to place trauma on the same level of importance as elective surgery, as evidenced by the interest displayed by the officers of the department of surgery as well as by the nurses and enlisted and civilian ward attendants. The pride of achievement of good results has had a stimulating effect on all concerned.

3. *To concentrate in a single ward for purposes of convenience the clinical material on trauma for teaching purposes.* Teaching ward rounds are conducted regularly on the trauma ward. All medical officers and attendants have an opportunity to critically evaluate and compare the results of management of many patients presenting the same or similar lesions. Concentration of injured patients in one ward makes it possible to devote each teaching period to one or more facets of the trauma problem. For example, the local care of the burn wound, or the management of patients with severed tendons, may be suitable subjects for discussion when a number of patients with these types of injuries are in the ward.

4. *To develop by close observation and documentation methods of improving the care of acutely traumatized patients.* Special attention has been given to the maintenance of detailed clinical records on all injured patients. Special efforts are made to implement clinical records by serial photographs, roentgenograms, bacteriologic studies, and other ancillary pertinent data. The accumulated material is put to use in the preparation and presentation of papers at medical meetings, and particularly at the

Symposium on Trauma which the department of surgery is conducting this year. Periodic study and analysis of the experiences gained through operation of the ward point the way to clinical investigation in these areas.

5. *To prepare military personnel to cope with large numbers of casualties resulting from mass disasters.* A trauma ward in a military hospital is an invaluable proving ground for many of the problems to be expected in caring for large numbers of injured patients occurring either in peacetime or in time of war. The basic lessons learned may be readily translated to operations of greater magnitude. Such adjustment both in war and in peace is one that is required of all components of the military in an emergency.

### SUMMARY AND CONCLUSIONS

A trauma ward was established at this hospital because of the large numbers of acutely injured patients requiring hospitalization. A report on the first six months of its operation indicates that the majority of patients treated were those with soft-tissue injuries, with or without cerebral trauma and with or without fractures. Three hundred and sixty-eight patients with 430 recorded diagnoses were admitted and treated in this period. The average stay on the ward was 12 days.

Experiences to date suggest that the functions of a trauma ward are: (a) to ensure the prompt and efficient treatment of acutely injured patients; (b) to focus special attention on trauma; (c) to concentrate injured patients in a single ward for purposes of convenience, uniformity of treatment, teaching, and study; (d) to develop, by close observation and documentation, methods of improving the care of acutely traumatized patients; and (e) to prepare military personnel to cope with large numbers of casualties resulting from mass disasters.

It was concluded that: (1) A trauma ward is of definite value in a military teaching hospital caring for significant numbers of acutely injured patients, and should be a part of the general surgical service. (2) All general surgical officers should be rotated in their assignments through the trauma ward and be given continuing opportunities to participate in the care of injured patients. (3) The trauma ward should be adequate in size and conveniently located with relation to the receiving office, operating suite, and radiology department. (4) Space, supplies, and equipment for treating patients in shock should be a part of the trauma ward.

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# THE "UNITARIAN CONCEPT" OF THE TREPONEMAL DISEASES

SAMUEL L. MOSCHELLA, *Lieutenant Commander, MC, USN*

**A**RE YOU a "lumper" or a classifier? Many of the controversial overlapping clinical signs and symptoms seen in the various treponemal infections become less controversial if one could accept the possibility of these being various clinical reaction patterns of one disease. About four decades ago this concept was suggested by Hutchinson<sup>1</sup> and Stitt.<sup>2</sup> Hudson<sup>3,4</sup> subsequently elaborated and described it as the "unitarian concept" of treponemal diseases. For years it received little attention in the United States and much resistance outside them.

What is this concept? It maintains that all treponematoses—syphilis, yaws, pinta, bejel, njovera, colonial native syphilis of the French, endemic syphilis of Bosnia and Herzegovina, medieval syphilis, and other endemic syphiloid infections—are clinical entities or syndromes. They are caused by various strains of *Treponema pallidum*, whose clinical behavior has been physiologically conditioned by environmental influences, the passage of time, and the infected races. The environmental influences on *T. pallidum* are the climate, the customs and habits of the people, the general hygienic status, and the endemic diseases. Some physicians feel that the economic factor and the way of life are responsible only for the distribution of these diseases. Turner<sup>5,6</sup> believed that each disease results from a different causative agent with inherent biologic differences and offers his rabbit inoculation studies as evidence. However, he was unable to diagnose 55 out of 380 patients as being infected with either syphilis or yaws. Hudson<sup>3,4</sup> did not accept the geographic and clinical differences of these infections as the basis for a biologic classification, but emphasized the morphologic as well as the immunologic similarities.

In 1932, Blacklock,<sup>7</sup> in comparing yaws and syphilis, stated that it was time to stop "flogging a dead horse." However, in view of the recent literature and new advances in medicine, the controversial "dead horse" merits resurrection and re-examination.

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From U. S. Naval Hospital, Navy 115, FPO, New York, N. Y.

This paper was read in Spanish before a joint meeting of the Medical Society of Santiago de Cuba and its guests, the physicians of the U. S. Naval Hospital, Guantanamo Bay, Cuba, on 11 December 1955.



Under the electron microscope there are no morphologic differences in the organisms causing syphilis, yaws, pinta, and bejel. When comparable lesions of the various accepted diseases are examined histologically, there are no obvious or definite differences. Williams<sup>4</sup> and Ferris and Turner<sup>5</sup> were unable to give definite and reliable histologic criteria for differentiating the cutaneous and subcutaneous lesions of yaws and syphilis.

A review of the clinically significant similarities and dissimilarities of the more common syphiloid infections<sup>10</sup> may enhance one's appraisal of Hudson's<sup>11</sup> attempt to identify these as clinically dynamic variants of one disease. All these treponemal entities have in common, to some degree, early and late manifestations with an intervening period of latency. However, only syphilis allows itself to be sharply divided into clinical stages. Applied to yaws and pinta the term "primary" is self explanatory, but the "secondary" and "tertiary" stages are not so clear and do not explain the co-existence of these different stages. In yaws, Hill, Kodijat, and Sardati<sup>12</sup> were unable to accept the arbitrary divisions suggested by Spittel<sup>13</sup> that the secondary stage extends to three years after the primary lesion and that the tertiary stage extends beyond the three years. Hasselmann<sup>14</sup> stated that the novice must be cognizant of the polymorphous nature of both the course and the skin manifestations of yaws.

The chancre complex, an indurated ulcer with a satellite node as the initial lesion of a spirochetal infection, is only demonstrable in primary syphilis. The congenital transmission of syphilis probably stems from the infection of adults in the childbearing age. The absence of plantar hyperkeratosis has been attributed to the wearing of shoes. In the past the significant incidence of visceral involvement in syphilis may have been due to a modified biologic response conditioned by the low incidence of the disease, the predominance of adult infection, and treatment. Wilcox<sup>15</sup> believed that if any discrepancy does exist in the relative incidence of central nervous system syphilis in the African Negro after adequate spinal fluid examination, it is only due to the endemic malaria.

Yaws, unlike syphilis, is not associated with congenital transmission, alopecia, mucous membrane lesions, eye lesions, or nervous or cardiovascular lesions. However, Hackett<sup>16</sup> reported a 5 per cent incidence of mucous membrane lesions. Turner<sup>5</sup> regarded the protracted generalized eruption of yaws the most outstanding difference between it and syphilis. There is a greater incidence of juxta-articular nodules and gangosa in yaws and bejel than in syphilis. The depigmentary lesions of yaws and bejel are late manifestations and can simulate pinta.<sup>17</sup>

Yaws may leave permanent scarring and keloid formation in contrast to the other treponemal infections.

Bejel,<sup>17-19</sup> "yaws of the desert," is a nonvenereal type of syphilis in a group of people in whom the diseases of yaws and syphilis can be excluded. Like yaws, it does not have a congenital transmission or a chancre lesion, and the presence of visceral involvement is controversial. Stannus<sup>20</sup> stated that yaws occurs exclusively in dark-skinned peoples while bejel affects Semitic peoples. There is plantar hyperkeratosis, patchy alopecia, juxta-articular nodules, bone involvement, and the tendency to disappear when brought into contact with civilizing influences.<sup>21</sup> Varela<sup>22</sup> stated that bejel, like syphilis, has spinal fluid changes, central nervous system symptoms, and transplacental reaginemia. Like syphilis, 30 per cent of the untreated patients may develop late signs. These may be manifested by gumma, nasopalatine lesions, periostitis, laryngeal lesions, and pigmentary disturbance. Since bejel is contracted in an arid climate, the eruption is predominantly flexural and resembles, in distribution and character, the cutaneous lesions of yaws in less humid areas.<sup>23</sup> Wilcox<sup>24</sup> described njovera as endemic syphilis of Southern Rhodesia and probably identical with bejel.

Pinta<sup>25-27</sup> begins with an extragenital papule and develops a disseminated secondary eruption that may be indistinguishable from that of other spirochetal infections. It is not congenitally transmitted. Leon Blanco and de Laosa<sup>28</sup> reported late mucosal lesions resembling an achromic and erythematous stomatitis areatus. There are plantar and palmar hyperkeratoses, juxta-articular nodules, lymphadenopathy, and evidence of cardiovascular and spinal fluid changes. The Cuban type of pinta has a greater tendency to visceral involvement than the Mexican type. Allen and Goodale<sup>29</sup> described pinta-like lesions among the natives of Guam, which is an endemic area of yaws. Fox<sup>30</sup> stated that there are no bone lesions or gangosa in pinta. If one accepts the above, he must assume that when dyschromia is associated with bone lesions or gangosa, it is due to yaws or bejel, not pinta. The question arises: Are we elevating a clinical sign, dyschromia, to the position of a disease?<sup>3</sup>

At present, any attempt to unify these treponemal infections on an immunologic basis is fraught with many obstacles. There is available neither an animal which is suitable for experimental study nor a serologic test that can measure immunity in man or animal. There is a considerable amount of epidemiologic evidence that syphilis is rare in regions where yaws is endemic and that an attack of yaws confers an immunity to syphilis. Turner<sup>6</sup> stated that syphilis confers an immunity to yaws which is as great as, if not greater than, that conferred by yaws itself

Leon Blanco<sup>11</sup> observed a slower development of pinta in syphilitic patients as well as a slowness or failure of pinta lesions to develop in patients with yaws. Experiments with monkeys convincingly demonstrate a reciprocal immunity between yaws and syphilis: it has been demonstrated that monkeys with syphilis develop immunity to both yaws and syphilis earlier than do those initially infected with yaws.<sup>12</sup> The experiments on rabbits have been less conclusive. Contrary to earlier reports, Leon Blanco and Oteiza<sup>13</sup> successfully inoculated rabbits with pinta.

The exact relationship of the treponemal immobilizing antibody to immunity is not yet clear. The studies carried out with rabbits and mice have been controversial and the different results variously explained. Khan, Nelson, and Turner<sup>14</sup> found experimentally a high cross-immobilizing reactivity between *T. pallidum* and *Treponema pertenue*. They felt that these two treponemes were closely related antigenically. In their preliminary studies in experimental syphilis, Turner and Nelson<sup>15</sup> showed that the immobilizing antibody titer approximately parallels immunity to re-infection; they speculated that the above may occur in yaws. These results appeared to substantiate serologically the immunologic observations in man and experimental animals. Turner and Nelson offered to explain the differences in the clinical patterns of the treponemal diseases as being due to some antigenic differences that are not detectable by the present immobilization test or other biologic properties of the spirochetes. However, McLeod and Magnuson<sup>16</sup> and Magnuson, Thompson, and McLeod<sup>17</sup> were unable to demonstrate a close relationship between the strains of syphilis and yaws spirochetes in a protective sense in spite of demonstrating cross immobilization. They described the immobilizing antibody as a group antibody which is related to reagin, most active against the homologous strains of spirochetes, and produced by an antigen common to different strains and species of treponemes. They believed that to identify immunity in man with the immobilization test would be subject to much controversy, that the acquired immunity to syphilis may be due to other antibodies not assayed in the immobilization test, and that the role of nonhumoral factors must be seriously considered. They<sup>18</sup> were able to produce immobilizing antibodies by injecting rabbits and mice with killed organisms; however, they were unable to demonstrate an accompanying immunity to *T. pallidum*. This was submitted as additional evidence that the Treponemal Immobilization (T. P. I.) Test does not represent the protective mechanism in experimental syphilis. Kahn and Gutierrez Villegas<sup>19</sup> demonstrated that the universal serologic reaction in Mexican pinta was identical with the pattern given by yaws.

Nell<sup>40</sup> demonstrated that the treponemes isolated from the diseases of syphilis, yaws, and bejel exhibit a similar in vitro response to penicillin. On the basis of clinical response and easy use for mass therapy, Rein, Kitchen, and Petrus<sup>41</sup> believed that repository penicillin is the drug of choice in the treatment of yaws. There was complete healing of all lesions within three months. However, the serologic response to penicillin was much slower and less satisfactory than in early syphilis. Greater amounts of penicillin did not significantly alter the incidence of serologic cures. For pinta, Rein and associates<sup>42</sup> noted that 1,190 mg (1,200,000 units) of crystalline procaine penicillin G in oil with 2 per cent aluminum monostearate given intramuscularly resulted in serologic improvement in 52 per cent of patients, disappearance of pintids in 68.9 per cent, and no improvement of late lesions in 9.9 per cent. In bejel, Csonka failed to cure skeletal involvement with 1,190 mg and suggested 2,380 mg (2,400,000 units). Following adequate treatment of a group of unselected cases of bejel, Csonka found that 31 per cent of the patients became serologically negative within a year in contrast to 15.8 per cent of a clinically similar group of patients with pinta reported by Rein and co-workers.<sup>42</sup> In yaws Ampofo and Findlay<sup>43</sup> found that the action of Aureomycin (brand of chlortetracycline hydrochloride) was somewhat slower than penicillin; however, Lins and associates<sup>44</sup> observed that oral administration of Aureomycin has an immediate therapeutic action comparable to that of penicillin. Ampofo and Findlay prefer Aureomycin for mass therapy since no intramuscular injection is required. Lins and co-workers observed complete healing of yaws lesions in from 15 to 16 days with 4.55 grams of Aureomycin for infants and 24 grams for adults. Loughlin and Joseph<sup>45</sup> considered Terramycin (brand of oxytetracycline) to be more effective than penicillin in the early phases of yaws. They believed that the incidence of infectious relapse is much less than that observed after treatment with penicillin. It appears that, like syphilis, the dosage for optimum therapeutic effect is dictated by the phase of the treponemal infection. A larger amount of the antibiotic, given over a longer period of time, is required in the late phase of the infection or in the presence of visceral involvement.

No disease has ever been treated out of existence; therefore, in spite of the presence of very effective drugs, supplementary long-term measures are necessary. Resurveys of entire populations for relapse or re-infection should be carried out at intervals of no less than 6 to 12 months for several years. Serologic tests should be used systematically for primary control. It is also desirable to treat routinely contacts of the infectious patients so that the reservoir of infectiousness will be shrunk

and the spread of infection will be slowed down. However, in the countries where these infections prevail, the socio-economic situation is such that a well-established and maintained control setup may take years to be developed. In the interim, periodic routine mass therapy may be the answer.

### SUMMARY AND CONCLUSIONS

In spite of the recent advances in medical science, Hudson's "unitarian concept" still remains speculative and provocative. Although the treponemes appear morphologically indistinguishable under the electron microscope, there has not been demonstrated sufficient biologic, immunologic, or experimental evidence to warrant unanimous acceptance of Hudson's concept. A comparison of the various clinical expressions of these diseases re-emphasizes the fascinating possibility that they may be clinical entities or syndromes. This approach is consistent with modern medicine's attempt to form a dynamic concept of disease in order to comprehend its origin and evolution. Upon review of the literature, one gathers the impression that where pinta is endemic, the unitarian concept is least accepted; that where bejel is endemic, the concept is most acceptable; and that where yaws is endemic, there are mixed reactions.

The treponemal immobilization antibody appears to be produced by an antigen common to the different strains and species of the treponemes and appears to be no measure of immunity. Repository penicillin, Aureomycin, and Terramycin are very effective in the treatment and control of these treponemal infections. The principles for effective therapy parallel those experienced in the treatment of syphilis. The successful control of these diseases will require a well-established program and adequate physical facilities. Until the socio-economic level of the infected countries is raised sufficiently to afford such a setup, periodic mass therapy is the temporary solution.

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#### INTERNATIONAL CANCER CYTOLOGY CONGRESS TO BE HELD IN OCTOBER

The 1956 International Cancer Cytology Congress, sponsored by the American Society of Clinical Pathologists, the College of American Pathologists, the Intersociety Cytology Council, and the International Union Against Cancer, will be held at the Drake Hotel in Chicago, Ill., 8 to 13 October 1956.

The general theme of the Congress will be Exfoliative Cytology, and the program will stress but not be devoted exclusively to the subject.

During this period three of the sponsoring organizations, with a combined membership of approximately 3,000 pathologists and other physicians, will hold their annual meetings:

The College of American Pathologists, the evening of Monday, 8 October.

The Intersociety Cytology Council, the evening of Wednesday, 10 October.

The American Society of Clinical Pathologists, the evening of Thursday, 11 October.

For information address: Dr. A. H. Dearing, Executive Secretary, College of American Pathologists, Prudential Plaza, Chicago 1, Ill.,

# OCCURRENCE OF COXSACKIE VIRUS IN THE HAWAIIAN ISLANDS

HARVEY L. RUBIN, *Lieutenant Colonel, VC, USA*

SARA E. RANSOM, *M. S.*

WALTER S. PRICE, *Major, MC, USA*

**I**SOLATIONS of viruses of the Coxsackie group have been reported from many parts of the Western Hemisphere, Europe, Asia, Africa, and Australia.<sup>1</sup> This is to report what is believed to be the first isolation of Coxsackie virus from the Hawaiian Islands.<sup>2</sup>

Material for this study was obtained from a 25-month-old boy, a military dependent with herpangina, who had been living on the Islands over six months. He was first examined because of irritability, fever, and diarrhea. Physical examination was negative except for moderately inflamed tonsils without ulceration. Roentgenographic examination of the chest, and a urinalysis were normal. A diagnosis of tonsillitis was made, and the child was given 297.2 mg (300,000 units) of procaine penicillin. Later the same day the child had three generalized convulsions associated with a temperature of 104°F.

Three days later the patient had no fever and appeared well, but had severe pain upon swallowing. Examination of the throat revealed very red anterior tonsillar pillars, on the right one of which were three distinct small round ulcers measuring 2 to 3 mm in diameter. A similar ulcer appeared on the uvula. Herpangina was suspected, and stool and blood specimens were collected. The following day the child was improved, antibiotics were discontinued, and an uneventful convalescence followed.

A distilled water suspension of fecal material, collected on the fifth day of illness, was treated to destroy bacteria, and inoculated into three- or four-day- and four-week-old white mice.<sup>3</sup> All suckling mice developed paralysis on the second day after inoculation. The adult mice showed no evidence of illness 14 days after initial inoculation. Successive passages of material from infected leg muscle tissue in suckling mice caused paralysis and/or death.

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From Tripler Army Hospital, Honolulu, T. H. Col. Rubin is now assigned to the Chemical Corps School, Fort McClellan, Ala.



Neutralization studies using sera from the patient in acute and convalescent stages of the disease and homologous virus demonstrated complete neutralization with convalescent serum but failure of neutralization with serum from the acute stage.

Histopathologic examination of tissue from paralyzed mice showed pathologic changes involving only the voluntary skeletal muscle. The pathologic reaction observed was typical of the early changes usually seen in newborn mice infected with Cocksackie group A type virus.

Virus suspensions from muscle tissue submitted for identification to the Walter Reed Army Institute of Research was typed as Cocksackie A<sup>4</sup> (hi-point).\*

Since this primary finding, Cocksackie virus has been isolated from fecal specimens from five different military dependents in the Hawaiian Islands. Two had clinical evidence of herpangina and the remaining were family contacts. All strains, when tested in infant mice, caused paralysis and histopathologic changes conforming to those seen in Cocksackie infections.

Thus it is evident that the Hawaiian Islands can be included in what is believed to be world-wide distribution of the Cocksackie group of viruses.

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\*Identification made by Robert J. Huebner, M. D., National Institutes of Health, Bethesda, Md.

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#### PROTEIN AND CIRRHOSIS

"The fact that protein deficiency may be an important etiological factor in cirrhosis does not imply that a high rather than a normal protein diet is necessary as treatment. In fact, most clinics now emphasize that it is far more important that the patients eat food of adequate quantity and quality than it is that a specific or peculiar diet be furnished."

—CHARLES S. DAVIDSON, M. D.  
in *Journal of American Medical Association*, p. 391, Feb. 4, 1956

# THE NUCLEOLI OF ATYPICAL LYMPHOCYTES IN INFECTIOUS MONONUCLEOSIS

WILLIAM W. AYRES, *Captain, MC, USN*

**T**HE NUCLEOLI of the atypical lymphocytes of infectious mononucleosis have received scant attention in the voluminous literature on the disease. The explanation for this oversight lies in the staining technics traditionally used in preparations of peripheral blood, since the dyes involved are not selective for nucleoli. In a study of nucleoli in fresh tissue and peripheral blood previously reported,<sup>1</sup> a method employing azure C was found to be particularly effective. The technic and its results in a study of the nucleoli of atypical lymphocytes in 20 cases of infectious mononucleosis are described in this report.

Nucleoli of cells in fixed peripheral blood stained with Wright's stain are poorly defined as a result of over-staining of chromatin and the consequent obscuring of the nucleoli. On the other hand, a postvital staining method using azure C results in selective staining of nucleoli and cytoplasm while the chromatin of the nucleus is unstained or only poorly stained; thus the nucleoli are clearly defined. In infectious mononucleosis, the nucleoli of many of the atypical lymphocytes, as demonstrated by the azure C method, are multiple, bizarre in shape, and large. In normal blood the nucleoli of lymphocytes and monocytes, the only nucleolated cells, are small and round.

## MATERIAL AND METHODS

**Preparation of Slides.** Slides containing a fine precipitate of azure C dye (monomethyl thionin - French) are prepared as follows: azure C dye, 0.25 gram, is dissolved in 100 ml of absolute C. P. methyl alcohol. One drop of this dye solution is placed on a slide and immediately covered with another slide. After the dye has diffused between the slides and the excess has been removed from the edges with gauze, the slides are rapidly pulled apart with a sliding horizontal motion. The alcohol evaporates, leaving a fine, even precipitate of dye on the slide. A very small drop of blood obtained from the finger is placed on a cover slip, which is then inverted over the dye-containing slide, allowing the blood to diffuse between the slide and the cover slip. The

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From U. S. Naval Hospital, Yokosuka, Japan. Capt. Ayres is now assigned to the Armed Forces Institute of Pathology, Washington, D. C.

nucleoli stain in 1 to 15 minutes. The preparations are not permanent but retain their tinctorial characteristics for periods up to 2 hours. The slides are examined with the low power lens, high dry lens, and the oil immersion lens.

Certain precautions must be observed if good results are to be obtained. The slides and cover slips should be dried after immersion in equal parts of acetone and alcohol. The amount of dye left on the slides should be small—only a barely perceptible azure color should remain after the alcohol has evaporated. The amount of azure C can be controlled by pressure on the slides when the alcohol-azure C solution is between them, and by wiping the excess dye from the edges of the slides. One corner of the prepared slide should be marked on the dye-bearing surface with a wax pencil. Slides may be prepared in advance, as there is no deterioration on storage. The drop of blood should be of such size that when diffused between the slide and the cover slip it will not quite reach the edge of the latter. The cover slip may be lightly tapped to spread the blood so that it lies in a layer only one cell thick. Once placed, the cover slip should not be moved as this results in distortion of the cells.

Over-staining of the nuclei, which occurs if too much azure C is on the slide, usually accounts for failures in the employment of this method. If crystals of dye can be recognized in the complete preparation under the oil immersion lens, there is too much dye on the slide.

**Clinical Material.** This study is based on 20 cases of infectious mononucleosis occurring among personnel of the United States Naval Forces in the Far East. Most of the patients presented themselves with the characteristic clinical picture of fever, sore throat, lymphadenopathy, splenomegaly, lymphocytosis, and leukocytosis. In all cases the following laboratory procedures were carried out: total white blood cell counts, differential counts, total erythrocyte counts, hemoglobin determinations, azure C stains of peripheral blood, Wright's stain of peripheral blood for atypical lymphocytes, heterophil antibody determinations, presumptive Davidsohn tests, and differential Davidsohn tests.

The hematologic and serologic findings are shown in table 1. It will be noted that in all cases the presumptive titer was in the diagnostic titer range of 1:224 or over, guinea pig antigen only partially absorbed the antibody, and in only one case (case 5) did the antibody fail to be completely absorbed by sheep cells. This exception probably was attributable to the high concentration of antibody, which was 1:3584 in the presumptive test. Cases that did not meet the clinical and serologic criteria for the diagnosis of infectious mononucleosis were rejected.

The percentage of atypical lymphocytes in both Wright's stain preparations and azure C preparations was determined. One hundred lymphocytes were counted and classified as to their morphologic characteristics to determine the percentage of atypical cells.

As a control, the blood of 20 normal persons was studied by the same technics. In all of these normal cases, presumptive Davidsohn heterophil antibody tests were carried out. If the presumptive test was in titer of 1:56, a differential Davidsohn test was done. Cases in which there was any possibility of infectious mononucleosis were discarded. Also excluded were cases of such diseases as measles or infectious hepatitis, for atypical lymphocytes indistinguishable morphologically from those of infectious mononucleosis are present in smears of peripheral blood stained by the usual methods from patients with these infections.

### RESULTS WITH AZURE C DYE

**Atypical Lymphocytes in Infectious Mononucleosis.** Atypical lymphocytes varied in number, from a few to many in the fields examined. They measured from 15 to 20 microns in diameter, depending somewhat on the pressure of the coverslip. The nucleoli of the atypical lymphocytes were large, irregular in shape, and varied in number from 1 to 10 with an average of about 5 (fig. 1). The nucleoli stained a dark azure and stood out clearly from the pale blue-staining chromatin. The nucleus was eccentrically placed, oval to round in shape, often with a small indentation on the side toward the more abundant cytoplasm. The cytoplasm was the same dark azure as the nucleoli and sometimes contained vacuoles. At the indentation of the nucleus a few red granules were seen in the cytoplasm.

**Normal Lymphocytes and Monocytes.** In normal peripheral blood only two types of cells contain nucleoli—lymphocytes and monocytes. The lymphocyte<sup>1-3</sup> measures about 7 microns in diameter and contains a single round, azure, eccentric nucleolus with a central pale area. The nucleus stains pale blue and is well demarcated from the cytoplasm and the nucleolus. The cytoplasm is dark azure, forms a thin rim around the nucleus, and may contain a few red granules. The normal lymphocyte is readily distinguished from the atypical lymphocyte of infectious mononucleosis by its small size, small amount of cytoplasm, and the single round, eccentric nucleolus containing a single round vacuole (fig. 1).

The monocyte measures from 12 to 20 microns in diameter and has from 2 to 5 very small, solid azure nucleoli, which are often difficult to see. The nucleus is oval or reniform. The cytoplasm contains fine particles of azure-colored material. The monocyte

TABLE 1 Hematologic and serologic findings in infectious mononucleosis

Case	Total red blood cells (/μl) (millions)	Hemo-globin (g/100 ml)	Total white blood cells (/μl)	Differential count (per cent)							Stains for atypical lymphocytes		Davidsohn test		
				Juvenile cells	Band forms	Segmented neutrophils	Lymphocytes	Monocytes	Eosinophils	Basophils	Wright's	Azure C	Presumptive	Guinea pig kidney	Reef cells
1	4.4	12.5	12,850	0	2	24	74	0	0	0	18	9	1-896	1-448	Neg.
2	3.9	11.5	10,000	0	0	33	64	3	0	0	16	5	1-896	1-224	Neg.
3	5.0	13.5	16,100	0	3	50	44	1	1	1	13	5	1-896	1-448	Neg.
4	5.0	13.5	19,050	0	2	40	51	5	1	1	55	59	1-448	1-224	Neg.
5	4.6	13.5	18,100	1	0	23	75	1	1	0	52	15	1-3584	1-1792	1-896
6	5.0	14.0	14,400	0	0	38	62	0	0	0	5	4	1-896	1-224	Neg.
7	3.76	11.5	4,300	0	0	26	60	12	2	0	15	3	1-896	1-224	Neg.
8	5.2	13.5	8,700	0	3	22	74	1	0	0	36	13	1-1792	1-448	Neg.
9	4.7	13.5	21,100	0	0	18	79	0	2	1	94	54	1-448	1-224	Neg.
10	5.2	14.0	12,150	0	4	21	75	0	0	0	80	17	1-596	1-224	Neg.

TABLE 1. Hematologic and serologic findings in infectious mononucleosis—Continued

Case	Total red blood cells ( $\mu$ l) (millions)	Hemo-globin (g/100 ml)	Total white blood cells ( $\mu$ l)	Differential count (per cent)							Stains for atypical lymphocytes		Davidsohn test		
				Juvenile cells	Band forms	Segmented neutrophils	Lymphocytes	Monocytes	Eosinophils	Basophils	Wright's	Azure C	Presumptive	Guinea pig kidney	Deef cells
11	5.0	14.0	6,950	0	5	32	61	2	0	0	80	19	1-224	1-224	Neg.
12	4.8	13.0	14,300	0	2	20	70	8	0	0	94	78	1-896	1-224	Neg.
13	4.2	12.5	9,100	0	0	15	82	2	0	1	86	84	1-896	1-448	Neg.
14	5.0	14.0	10,900	0	0	13	86	0	1	0	95	83	1-896	1-448	Neg.
15	5.0	13.0	14,000	2	2	15	79	1	1	0	90	85	1-448	1-224	Neg.
16	5.04	13.5	22,900	0	2	7	97	2	1	1	77	75	1-1792	1-448	Neg.
17	3.43	10.0	8,700	0	4	5	89	2	0	0	91	56	1-448	1-224	Neg.
18	5.5	14.0	6,950	0	0	31	61	4	4	0	53	13	1-896	1-448	Neg.
19	5.2	13.5	14,400	0	1	6	93	0	0	0	60	59	1-224	1-28	Neg.
20	5.4	13.0	19,750	0	1	17	78	2	2	0	71	57	1-224	1-112	Neg.

can be distinguished from the atypical lymphocyte by its very small round nucleoli, the absence of dark azure homogenous cytoplasm, and the presence of numerous azure-red cytoplasmic granules.

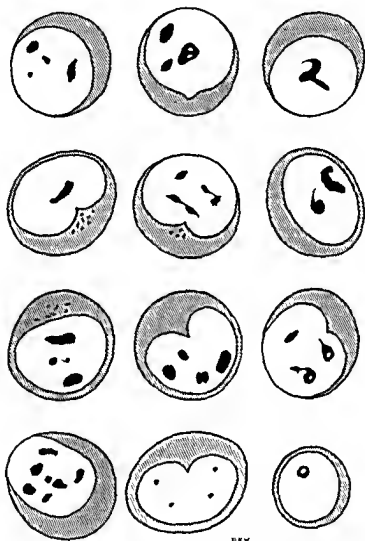


Figure 1. Diagrammatic drawing of atypical lymphocytes and a normal monocyte and lymphocyte stained by the azure C method. All cells except the two toward the right in the bottom row are atypical lymphocytes. Note the numerous large, bizarre nucleoli and basophilic cytoplasm. The middle cell in the bottom row represents a monocyte, the right-hand cell in the bottom row represents a small lymphocyte.

Guzman<sup>2,3</sup> has given excellent descriptions of the nucleoli of monocytes and lymphocytes as demonstrated by a technic using the same principles as the azure C technic (fig. 1).

**Other Cells in Normal Blood.** Cells of the granulocytic series and red blood cells in peripheral blood are not nucleolated. The neutrophils have a lobulated nucleus that tends to over-stain, and numerous fine azure granules in a clear cytoplasm. As the preparation becomes older, large red-staining cytoplasmic vacuoles may form, and fine strands, presumably of dye, precipitate in the cytoplasm. This precipitation of dye occurs rarely and then less prominently in lymphocytes and monocytes. The granules of the basophil stain an intense red with the result that this cell is readily recognized. The larger granules of the eosinophil take only a light azure tint; occasionally a few of the granules stain a dark red. The red blood cells in fresh preparations do not stain; in older preparations some of them take on a light azure tint. The reticulum of reticulocytes stains a reddish brown. The platelets show fine red granules in a light blue hyaloplasm.

**Results in Infectious Mononucleosis.** The results are summarized in table 1. It will be noted that atypical lymphocytes were found by both the Wright and the azure C methods. In the 20 cases studied, atypical lymphocytes averaged 59 per cent in Wright's stain preparations and 40 per cent in azure C preparations.

A lymph node was removed from one patient with atypical lymphocytosis. Material obtained by scraping the freshly cut surface of the node was emulsified in serum and stained by the azure C method. Atypical lymphocytes with the same morphologic features as those in the peripheral blood were demonstrated.

**Results in Normal Persons.** No abnormal lymphocytes were found in either the azure C preparations or Wright's stain preparations.

## DISCUSSION

In the peripheral blood of patients with infectious mononucleosis, stained by the azure C method, the nucleoli in atypical lymphocytes are numerous, bizarre in shape, and readily differentiated from the nucleoli of monocytes and lymphocytes. Another characteristic of the atypical lymphocytes stained by this method is the intense basophilia of the cytoplasm.

In a review of the literature on infectious mononucleosis, no reports primarily concerned with the nucleoli of the atypical lymphocytes were found, although the appearance of these atypical cells in preparations with Wright's or one of the other Romanowsky stains was described by many authors. Downey and McKinlay<sup>4</sup> identified only an occasional atypical lymphocyte



containing 1 or 2 nucleoli—the Type III Downey cell. Downey and Stasney,<sup>6</sup> in their first series of 9 cases of infectious mononucleosis, reported only one case in which the lymphocytes were immature and had some nucleoli. They re-emphasized this point in 1936<sup>7</sup> by stating that the blood of patients with infectious mononucleosis contained only a few genuinely immature lymphoblasts with leptochromatic nuclear structure and nucleoli. They studied imprints of a biopsied lymph node from one of their cases, stained by the Giemsa-May-Grunewald technic, but found only one atypical cell with two round nucleoli. Lehdorff and Schwarz,<sup>7</sup> who used Romanowsky stains, described three types of cells in infectious mononucleosis: “lymphoblasts,” lymphocytoid cells, and monocytoid cells. The youngest cells, or “lymphoblasts,” contained several nucleoli. Limarzi, Paul, and Poncher,<sup>8</sup> observed that only the Type III Downey cells contain nucleoli.

A few studies of the atypical lymphocytes of infectious mononucleosis have been carried out using a supravital technic. Gall,<sup>9</sup> who stained supravital preparations with Janus green and neutral red, found no abnormalities in the nucleoli of the atypical lymphocytes. McLean,<sup>10</sup> using a similar technic, observed no nucleoli in these lymphocytes. The negative results of Gall and McLean are not surprising since the dyes they used are selective for mitochondria and cytoplasmic vacuoles, not for nucleoli or cytoplasm.

The reason for using the azure C method rather than staining fixed smears with methylene blue or its homologues is that changes occur in cells fixed by heat, methyl alcohol, or even drying that inhibit their susceptibility to any of these stains. In other words, the cells must be unfixed if a fine degree of differential staining is desired. The success of the method using unfixed tissue in wet preparations probably is due to the avidity of methylene blue and its homologue, azure C, for the ribose nucleic acid of the nucleoli and cytoplasm in preference to the desoxyribose nucleic acid of the chromatin. This is not to say that azure C and other oxidation derivatives of methylene blue will not stain chromatin in wet preparations. This they will do, if the strength of the dye is increased above that in the method herein described, or if the action of the dye on the cells is unduly prolonged. No claim is made that azure C is the only stain selective in wet preparations for ribose nucleic acid. Similar selectivity in wet preparations can be obtained, but not as well, with azure A, azure B, thionin, and even brilliant cresyl blue. This selectivity of certain dyes for nucleoli has been recognized for many years and has been used extensively for staining the nucleoli of malignant cells by MacCarty,<sup>11,12</sup> Quensel,<sup>13,14</sup> Saxen,<sup>15</sup> and von Ilkum and Alexander.<sup>16</sup>

As emphasized by Ludford,<sup>17</sup> the nucleoli of atypical lymphocytes may be expected to be large, multiple, and bizarre in shape, since cells that are actively growing and actively metabolic show these nucleolar changes.

In the diagnosis of infectious mononucleosis, the azure C method probably is of only confirmatory value. The percentage of atypical lymphocytes in fixed preparations with Wright's stain was higher than in azure C preparations. Although the nucleoli are best seen by means of the azure C technic, the changes in the cytoplasm and nucleus are demonstrated more frequently and more characteristically by Wright's stain.

### CONCLUSIONS

1. The nucleoli of many atypical lymphocytes in infectious mononucleosis stained by the azure C method are large, numerous, and irregular in shape.

2. These nucleolar changes in atypical lymphocytes as demonstrated by the azure C method are of only confirmatory diagnostic value.

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### WHAT IS EPIDEMIOLOGY?

"It is indeed clear from current usage that the definition of epidemiology has been extended far beyond its original sense as the doctrine or science of epidemics. It is certain that its scope is not limited to diseases in which epidemics are characteristic, since it is in conformity with good usage to consider the epidemiology of tuberculosis, for example. Furthermore, its scope is not limited to communicable disease because it is proper to speak of the epidemiology of cancer, of scurvy, of accidents. The extent of change in the meaning of epidemiology is borne out in the following generally accepted definition: This is a field of science which is concerned with the various factors and conditions which determine the occurrence and distribution of health, disease, defect, disability, and death among aggregations of individuals; it has application also to problems other than those of health and disease."

—E. GURNEY CLARK, M. D.  
in *Journal of Chronic Diseases*  
p. 595, Nov. 1955

# OBTAINING A MORE ACCURATE BASAL METABOLIC RATE BY SPIROMETER

JAMES C. SYNER, *Major, MC, USA*

**B**EFORE the basal metabolic rate (B.M.R.) test falls into the oblivion of a rubbish heap, I consider it worthwhile to underscore a recent experience in personally performing this procedure. As my experience accumulated I became increasingly aware of how easy it was to destroy the value of the test by seemingly unimportant details. I came to recognize that this was not a "simple" test to be handled by just anyone assigned to the task. The need for close supervision of even the most conscientious technician was impressed upon me. The crowning reward was the obtaining of improved results which more closely correlated with available clinical and laboratory data.

This report will not be a review of the specifications for any pitfalls of B.M.R. testing. The subject has been covered in detail and an extensive bibliography is available; in particular, a report by Kyle<sup>1</sup> is recommended.

## METHODOLOGY IN TRANSITIONS—DANGERS AND CONFUSIONS

The old can be as essential as documenting the new. This is especially true of reminders about abuses and incompetent handling of methodology. Methods that have been available for long periods may fall heir to many sins. Familiarity can become extremely superficial and support unrecognized degrees of carelessness. When traditional methodology is tentatively tagged for replacement by more specific, so-called scientific approaches, it may be further jeopardized by poorly motivated handling. As the pendulum swings from one extreme to the other, a vacuum can be created which is negativistic in character. Within such a transitional setting distrust of a procedure's reliability to fulfill its purpose may grow like the figures of public opinion, namely, more from rumor than from careful, objective investigation of facts.

This, to my way of thinking, is the present status of the B.M.R. as a measure of thyroid function. Newer, more specific technics

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and B.M.R. measurement). Obviously these factors limit the specificity and sensitivity of the test. In the important aspect of post- $I^{131}$  treatment follow-up and management of hyperthyroidism, their work shows that in 84 per cent of 131 patients there was a close correlation between the  $I^{131}$  uptake, the PBI level, B.M.R., and the clinical evaluation of the patient. Therefore, when properly processed, B.M.R. determinations can serve as a reliable index of thyroid response to  $I^{131}$  treatment.

Kyle<sup>11</sup> presented an excellent review of the problems involved in the measurement of metabolism. He stated that although the B.M.R. is inferior to other technics it can provide valuable assistance in quantitating the degree of hyperthyroidism and in following response to various therapeutic measures. This review emphasizes the need for following each specification in test performance, and an awareness of the many technical factors which can produce grossly abnormal results. Kyle's review certainly crystallizes the fact that this is not a "simplified" procedure which can be easily and adequately handled by any individual so designated regardless of motivation or level of training.

Bhattacharya et al.<sup>12</sup> concluded from their experience that a reliable diagnosis of thyroid function cannot be consistently arrived at from any one test alone. To arrive at the most reliable diagnosis one must carry out several tests simultaneously and perform careful history, physical examination, and clinical observations. It is interesting to review their test results and note the wide range of values for normal and hyperthyroid patients (table 1). These data verify the limitations of specificity and sensitivity, and indicate the overlap between euthyroidism and disease states for all the popular indexes.

TABLE 1. *Results of tests in euthyroid and hyperthyroid patients (From Bhattacharya and associates<sup>12</sup>)*

Type of patient	Tests		
	B.M.R. (percent)	PBI ( $\mu$ g/100 ml)	$I^{131}$ uptake (percent)
Euthyroid	-15 to +23.6	4.2 to 9.8	15 to 55
Hyperthyroid	+16 to +84	8.2 to 26.7	39 to 88

Zieve, Skanse, and Schultz<sup>13</sup> undertook a study of the comparative value of the B.M.R.,  $I^{131}$  uptake, and PBI level in the diagnosis of borderline hyperthyroidism. They found that the  $I^{131}$  was the most effective test for differentiating the borderline hyperthyroid from the euthyroid patient. The serum PBI level was approximately four fifths as effective and the B.M.R., one fifth as effective. Their data also documented the wide range

have provided increasing statistical verification of the already appreciated fact that a B.M.R. has limitations in performance, rigorous (often inconvenient) specifications for execution, and marked potential for unreliable results. With growing availability of serum protein-bound iodine (PBI) and radioactive iodine ( $I^{131}$ ) uptake determinations, the limitations and pitfalls of the B.M.R. are increasingly emphasized. The popular interpretations of this data have been almost entirely unilateral, namely, as justifications for dropping the test. The implications of many comments are on the brink of a naïveté which implies that at long last a scientific test (either the  $I^{131}$  uptake or the PBI determination), which in itself is diagnostic of thyroidism, is available. The "faith" involved brings to light a kind of secret desire to have "numbers" replace the responsibility of "judgments." This opinion has waxed into such a distrust of the B.M.R. test that it is not unusual to hear physicians remark, "so what," when informed of the reading.

However, let us not forget that there is really nothing new about many of these comments on testing limitations, specifications, and error potential of the B.M.R. The majority of criticisms named are not original developments from analyses of the newer laboratory studies. There is a tremendous bibliography available on the uses, limitations, specifications, and diagnostic values of the B.M.R. in clinical practice.<sup>1-7</sup> The majority of these reports were documented well in advance of the contemporary "warnings" and "judgments." As early as 1932, Peters and Van Slyke<sup>2</sup> implied the limitations and specifications for optimum test performance. They indicated that the test is an indirect and nonspecific study, and reflects thyroid activity only as the hormone influences heat production and, consequently, oxygen consumption. It is not the function of this report to review this literature. However, it is considered pertinent to mention recent reports which discuss the place of B.M.R. testing in present-day study and management of thyroidism.

#### PROS AND CONS OF THE SITUATION

That there is still an important and valuable place for the B.M.R. determination in the diagnosis and management of thyroidism is suggested by recent reports.<sup>10-14</sup> The review article by Chapman and Maloof,<sup>10</sup> based on their experience in handling hyperthyroidism over a 10-year period substantiated this viewpoint. These authors concluded that accurate diagnosis and management is obtained only when several tests are utilized to evaluate thyroid function. No single test can be securely accepted as an absolute criterion of a specific disease state. To base a definitive diagnosis on any single test invites error. They point out the numerous factors which can effect each of the three most utilized indexes of thyroid function ( $I^{131}$  uptake, PBI level,

ism of hypermetabolism in such patients is not clear in all instances. It is suspected that oversight of this fact may contribute to the number of high B.M.R. results obtained in euthyroid patients.

TABLE 3. Comparison of  $I^{131}$  uptake and B.M.R. in 48 euthyroid patients  
(Adapted from scattergram compiled by Duffy and associates<sup>15</sup>)

$I^{131}$ uptake		B.M.R.	
Percent of cases above 45%	8.3	Percent of cases above +15	28
Percent of cases below 10%	8.3	Percent of cases below -15	8.3

### ABUSES, OVERSIGHTS, AND ERRORS

The following factors represent delinquencies which significantly influenced the test result. They occurred with significant frequency. The majority represented routine practices in the daily operation of the test.

**The Test Environment.** The requirement for a quiet, standardized, nonstimulating environment is unequivocal. During my experience I came across the repetition of many kinds and intensities of abuses. The open-ward situation was almost always entirely unsuited for a reliable test. Motor-driven floor cleaners, glaring lights, rattling window shades, juggling food carts, vociferous patients and staff personnel, and inspection preparations were but a few of the difficulties. The importance of all this was that almost always the physician applying results to a clinical problem was unaware of the situation. An illustrative case in point was a 24-year-old man tested on an open ward which housed some 40 patients. The test was performed while patients conversed and argued in loud voices, breakfast tray pick-up went on, and a floor polisher was operated. This test gave a B.M.R. of +32. Repeat study in a quiet room without lights gave a +11. Whereas the +32 was a reading confusing to the problem, the repeat study clarified the situation and was consistent with the clinical picture and other laboratory data. The test was not at fault, but rather our abuse of its specifications. It may well be a legitimate criticism of "inconvenience" that specifications are rigorous, but it cannot be classified as "fault."

**Accurate Data on Age, Weight, and Height.** This source of error was most surprising and originally pointed out by the patient's physician. Once there was an awareness of its presence, future checks uncovered its repetition. It had been customary for ward and technical personnel to make a bedside survey of this data



of values and overlapping characteristic of each test for normal and hyperthyroid patients (table 2).

Beierwaltes<sup>14</sup> concluded from his experience with thyrotoxicosis that a diagnosis can be made in most cases by adequate medical history, physical examination, B.M.R., and serum cholesterol. He believed that the optimum use of the  $I^{131}$  and PBI is in the diagnosis of certain problem cases. In regard to interpretations of the  $I^{131}$  and PBI, he cautioned that unwise actions can result unless it is fully realized that these studies do not measure the degree of clinical sickness called thyrotoxicosis. It was his opinion the PBI determination is so difficult to perform with consistent accuracy that its use is largely restricted to university laboratories.

TABLE 2. Results of tests in euthyroid and hyperthyroid patients (From Zieve, Skanse, and Schultz<sup>15</sup>)

Type of patient	Tests		
	B.M.R. (percent)	PBI ( $\mu$ g./100 ml)	$I^{131}$ uptake (percent)
Euthyroid	-16 to +49	3.1 to 11.7	43 to 87
Hyperthyroid	-6 to +63	4.7 to 17.9	8 to 64

Duffy and associates<sup>16</sup> reviewed their results in thyroid function testing and concluded that the time, personnel, and facilities involved in doing B.M.R. determinations would be better expended in the more objective and reliable tests, namely,  $I^{131}$  and PBI. Although no attempt is made to discuss their conclusion, I believe it pertinent to point out the data from one scattergram documented in their report. Table 3 gives comparative results for B.M.R. and  $I^{131}$  in 48 euthyroid patients. The percentage of patients who had results in a hypothyroid range was identical for both methods. The B.M.R. produced its poorest correlation, and supposedly its greatest index of unreliability, with the  $I^{131}$  uptake on the steep or "excitement" side of the oxygen uptake curve. In my personal experience this is the kind of oxygen uptake response most likely to be influenced by the testing environment and subjective state. I believe that careful attention to the circumstances of the test should result in elimination of many errors producing this kind of oxygen uptake slope. This kind of error in testing should be available to a high degree of control. Of further importance when a high oxygen uptake curve is obtained in the patient regarded as euthyroid is a revaluation of the differential diagnosis. Silver, Porco, and Crohn<sup>17</sup> reported a number of diseases which produced increase of the B.M.R. without the clinical picture of diffuse toxic goiter. The mechan-

ism of hypermetabolism in such patients is not clear in all instances. It is suspected that oversight of this fact may contribute to the number of high B.M.R. results obtained in euthyroid patients.

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if not previously recorded by actual measurement. When asked for physical measurements, the patient would estimate to the best of his recollection or judgment. An illustrative case involved a young man who underestimated weight and height sufficiently to produce a result of -28. When he was weighed and measured accurately, his result was -11. The initial result would have confused the picture and entered the statistical column as another "error" charged to the test. In reality it represented an abuse of well-defined test specifications.

**The Equipment.** Despite the obvious nature of this essential, its minor and major breakdowns were frequently overlooked. The case selected illustrates but one detail in faulty equipment. I have chosen this particular experience in order to emphasize how meticulous one's awareness of equipment failure must be. A young woman was tested, and a result of +44 reported. This was entirely inconsistent with the clinical appraisal and related studies of thyroid function. Inspection of the respiratory tracing revealed a pattern consistent with air leak. In review of possible sources it was noted that the sponge-rubber nose clip was markedly worn. Its condition was such that airtight fit was unpredictable. When a piece of stainless metal was held under the patient's nose, moisture condensation indicative of air leak appeared. Retest with a good nosepiece gave a result of -3, which was considered satisfactory. Other equipment failures included faulty mouthpieces (both leaks in the rubber and improper fittings), failure of carbon dioxide absorbent to keep up with expired air content, leaky joints, poor writing stylus, and faulty tubing. The point in emphasis is that in order to be found the faults had to be searched for.

**Analysis of the Respiratory Tracing.** The slope of the respiratory tracing represents the oxygen uptake. The usual practice is to draw a straight line by connecting representative points of the expiratory end phase of tidal exchange. This usually involves ignoring minor irregularities in the expiratory end position. Judgment is involved in selecting the most accurate and representative line for the oxygen uptake curve. Responsibility for this judgment rests with a technician since almost never in our situation did the physician review or evaluate the respiratory tracing. The case in point illustrates how marked an error can result from faulty judgment. Based upon the technician's judgment in negotiating an oxygen uptake slope, the B.M.R. result was +57. Review of the result with clinical picture and associated laboratory data emphasized how erroneous the result was. This patient had had a thyroid nodule removed which was shown to be malignant. Further treatment, including radioactive iodine, resulted in a clinical state of hypothyroidism. Review indicated that the early section of the respiratory tracing was highly irregular, con-



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"The cost of training a physician is \$10,000 to \$12,000, and the student pays only \$2,532 [on the average] during his four-year training."

—Newsletter of the Massachusetts  
Medical Society, Mar. 21, 1956

# METABOLIC DISEASES AND URINARY CALCULI

RICHARD P. SPENCER, *Lieutenant, MC, USNR*

**B**Y THE USE of technics presently available, most instances of urinary lithiasis cannot be related etiologically to a metabolic derangement. A small but very real percentage of such calculi are, however, a reflection of a disorder of intermediary metabolism. From the standpoints of immediate therapy and ultimate prognosis, it is therefore incumbent upon the physician to investigate the nature of the calculus and the possibility of a more fundamental underlying disease. The present report discusses several metabolic disorders associated with urinary lithiasis and outlines the general scheme for their investigation.

## URIC ACID CALCULI

There are two pathologic conditions that are associated with a high incidence of uric acid calculi (and with hyperuricemia).

**Gout.** Kittredge and Downs<sup>1</sup> found that over a nine-year period, 1.23 per cent of all patients admitted to the Ochsner Clinic had a history of urinary calculi; during the same interval, 14 per cent of 324 patients with gout gave such a history. The prevalence of urinary stones in gouty individuals was thus over 10 times that of the general clinic population. Renal damage in this condition has been ascribed to two factors, both resulting from uric acid precipitation: (1) deposition of crystals in renal tubules, (2) production of calculi with secondary obstruction and infection. Recognition of gout in an individual affected with calculi is therefore of importance, as control of the basic disease may retard further uric acid precipitation and obviate continued formation of concretions.

**Leukemia.** Infiltration of the kidney by neoplastic cells is frequent in the leukemic process. However, renal impairment in such a disease may stem from another source, namely, the deposition of uric acid calculi.<sup>2</sup> The turnover of cellular substances in the leukemic individual is apparently of such magnitude as to result in an increased outpouring of uric acid (the end point of purine metabolism in man). In addition, there may be an exacerbation of calculus formation during the treatment of leukemia by means of

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From U. S. Naval Hospital, Newport, R. I. Lt. Spencer is now assigned to the U. S. S. *Perry* (DD 844), FPO, New York, N. Y.

either irradiation<sup>7</sup> or nitrogen mustards<sup>8</sup> (presumably related to the liberation of purines from cells injured by the cytotoxic action of the therapeutic agent).

### CALCIUM CALCULI

The major portion of calcium excreted by the body is normally carried via the fecal stream. In hyperparathyroidism the quantity of calcium handled by the renal apparatus is increased both relatively and absolutely. Renal calculi composed of calcium are often found in cases of hyperparathyroidism, and this may be the presenting complaint. Indeed, damage to the kidneys is common in this entity.<sup>9</sup> A careful medical evaluation of the clinical situation and blood chemistry values is necessary, as part of the picture may be simulated by the milk-alkali syndrome of Burnett and associates<sup>10</sup> (in which hypercalcemia occurs without hypercalciuria). It must also be stressed that immobilization per se is followed by halisteresis and an increased incidence of calcium calculi<sup>11</sup> (and the transient hypercalcemia of recumbency may be aggravated by hypervitaminosis D).

### CALCIUM OXALATE CALCULI

Calcium oxalate forms a portion of many urinary concretions. Stones of this composition are also found in the infrequently described condition termed "oxalosis." Probably representing a specific defect of oxalic acid metabolism, oxalosis is characterized by the precipitation of the calcium salt of oxalic acid in extrasosseous locations. The syndrome is marked by the urinary excretion of calcium oxalate crystals, as well as resultant nephrolithiasis, nephrocalcinosis, renal failure, osteoporosis, and clusters of calcium oxalate crystals in various organs (including bone marrow). The diagnosis is established by identifying the crystals, finding an elevated 24-hour excretion of calcium oxalate, and possibly by aspirating typical crystals from one or more sites. Roentgenograms may reveal calculi with radiating spicules, considered characteristic of calcium oxalate.<sup>12</sup>

### XANTHINE CALCULI

Pure urinary xanthine stones have been identified several times, and there are approximately two dozen case reports in the literature. Dent and Philpot<sup>13</sup> described the only known metabolic study in an affected individual. These authors found that a 4½-year-old girl who passed a xanthine stone also excreted large quantities of xanthine in her urine, but almost no uric acid. The patient's serum uric acid level was also depressed (0.5 mg per 100 ml). Since uric acid is produced from xanthine (facilitated by the enzyme xanthinoxidase), one may speculate that either: (1) there was an error at the xanthinoxidase level, with diminished production of uric acid from xanthine, or (2) there was excessive clear-

ance of xanthine from plasma (error at the renal level) with quantities in the blood stream insufficient to be converted to uric acid (technics for measuring blood xanthine concentrations are not yet available).

Chemical identification of the calculus is sufficient to make the diagnosis. An individual may have xanthinuria, however, as shown by a urinary chromatogram, with no symptoms between bouts of renal colic.

### HOMOGENTISIC ACID CALCULI

Homogentisic acid is excreted in the urine of individuals affected with alkaptonuria; it is not found in normal urine specimens. The error of metabolism results from the absence of the homogentisic acid oxidative enzyme (which normally splits the compound, a metabolite of the amino acid tyrosine to fumarylacetoacetic acid). The alkaptonuric patient may be entirely asymptomatic or may show evidence of ochronosis (due to the deposition of derived pigments in cartilaginous and tendinous structures, with resultant pigmentation and arthritis). Alkaptonuric patients can show calculi in their bladders,<sup>10</sup> urethras, or prostate glands.<sup>11</sup> The stones are generally multiple, brown or black, and may be calcified. Identification of homogentisic acid in the urine establishes the diagnosis of alkaptonuria (although, of course, these individuals and the others discussed here may have urinary calculi unrelated to their basic disease).

### CYSTINE CALCULI

What was formerly termed "cystinuria" has been shown to be an inhomogeneous entity. The condition referred to as cystinuria consists of the urinary excretion of cystine, lysine, and arginine, possibly due to an error of the renal reabsorptive mechanism.<sup>12</sup> Such individuals are generally asymptomatic until they form calculi, but excretion of the three amino acids continues at all times.

Distinct from cystinuria are two conditions associated with a generalized amino aciduria: (1) Fanconi syndrome.<sup>13</sup> In addition to the amino aciduria, there occurs a urinary loss of electrolytes and glucose, the so called "amine diabetes." (2) Cystinosis.<sup>14</sup> Amino aciduria is associated with the deposition of cystine crystals at many sites, including cornea, bone marrow, and kidney, with renal damage.

Cystinuria can thus be distinguished from the latter entities by means of a urinary chromatogram. Cystinuria reveals the cystine-lysine-arginine pattern, while the other syndromes show a generalized amino aciduria, in addition to their individual defects.



## METHODS OF STUDY

Detection of a possible metabolic cause of a urinary calculus depends upon a twofold approach: (1) determination of the nature of the stone, and (2) study of the patient.

An individual suspected of having a urinary calculus should have his urine strained. Examination of the concretion, macroscopic and microscopic, may provide information as to its chemical nature (table 1). Care must be exercised not to overlook the urine proper, for small fragments may pass through the screening material, and the urine itself often contains quantities of the material which formed the calculus (table 2).

In addition to visual examination of the gravel, chemical tests may be employed, but because of inadequacies of chemical studies,<sup>13</sup> the procedures listed in table 3 should be considered only presumptive. Identification is accomplished by means of more detailed chemical study (including chromatographic, electrophoretic, and microchemical methods<sup>14</sup>), and physical and optical methods<sup>15</sup> (urinary calculi, being crystals, are amenable to optical study, as are other minerals).

Evaluation of the individual should include a dietary history (to rule out hypovitaminosis A, which may exacerbate the tendency to form calculi, and to consider the possibility of the milk-alkali syndrome), and a family history (to determine if siblings or other relatives are also suffering from urinary stones).

Approximately 9 out of 10 urinary calculi are radiopaque;<sup>17</sup> stones considered here which are nonopaque are those composed of pure uric acid, and pure xanthine (although, of course, detection ultimately depends upon the size of the calculus and overlying gas shadows). A roentgenogram of the abdomen may therefore be of assistance. Finally, other appropriate studies should be carried out as indicated (such as urinary Sulkowitch test, serum determinations of calcium, phosphorus and alkaline phosphatase, and roentgenograms of the long bones and lamina dura area in suspected hyperparathyroidism, blood uric acid determinations in suspected uric acid or xanthine calculi; plasma electrolyte studies, urine chromatography, and examination for systemic cystine crystals in any of the spectrum of "cystinurias").

In reviewing a number of clinical records of cases of urinary concretions, there appeared to be a lack of attention paid to the nature of the calculus, once passed. Study of the calculus may reveal valuable information as to whether a more basic disease is involved. Two cases may serve to illustrate this point.

TABLE 1. *Chemical structure and appearance of various calculi*

Type of calculi	Chemical structure	Appearance
Uric acid	$  \begin{array}{c}  \text{H} \cdot \text{N} - \text{C} = \text{O} \\    \quad \quad   \\  \text{O} = \text{C} \quad \text{C} - \text{NH} \\    \quad \quad    \quad \quad \diagup \\  \text{H} \cdot \text{N} - \text{C} - \text{NH} \quad \text{C} = \text{O}  \end{array}  $	Pure stones are often round and smooth; generally hard, ellipsoid or spherical, may be laminated, golden-yellow. <sup>18</sup>
Calcium	Ca	Depends on substance with which combined. White or discolored, hard.
Calcium oxalate	$\text{Ca} (\text{COO})_2$	Hard; brown, sepia, or gray; may have spinous appearance; mulberry calculi have nipple-like projections. <sup>18</sup> Crystals birefringent, occurring in sheaves of long needles and broken plates. <sup>19</sup>
Xanthine	$  \begin{array}{c}  \text{HN} - \text{C} = \text{O} \\    \quad \quad   \\  \text{O} = \text{C} \quad \text{C} - \text{NH} \\    \quad \quad    \quad \quad \diagup \\  \text{HN} - \text{C} - \text{N} \quad \text{CH}  \end{array}  $	Reddish brown, compact, hard, laminated, can be polished to a waxy luster. <sup>18</sup>
Homogentisic acid	$  \begin{array}{c}  \text{HO} \quad \text{CH}_2 \cdot \text{COOH} \\  \diagdown \quad \diagup \\  \text{C} = \text{C} \\  \diagup \quad \diagdown \\  \text{HO} \quad \text{CH}_2 \cdot \text{COOH}  \end{array}  $	Usually multiple, brown to black, may be calcified.
Cystine	$\text{HS} \cdot \text{CH}_2 \cdot \text{CH}(\text{NH}_2) \cdot \text{COOH}$	Generally crystalline, smooth, polished, green or yellow brown; may be mixed with phosphates, giving rough and granulated appearance. <sup>18</sup> Crystals almost colorless hexagons with unequal sides.

TABLE 2. *Urinary excretion of calculus-forming compounds*

Compound	Normal	Abnormal
Uric acid	Partially depends upon intake. <sup>20</sup>	Higher in 25% of gouty patients than in general population. <sup>20</sup>
Calcium	Equal to intake minus fecal loss in homeostatic adult; normally 10-30% intake in urine. <sup>21</sup>	Over 110 mg/day on 110 mg intake in hyperparathyroidism. <sup>21</sup>
Calcium oxalates	Approximately 22 mg/day in adult (free and combined acid). <sup>22</sup>	95 to 182 mg/day free and combined (65 to 122 mg/day of free acid) in case of oxalosis. <sup>22</sup> 200 and 180 mg/day total in two cases of oxalosis. <sup>23</sup>
Xanthine	14 mg/12 hours in one adult. <sup>23</sup>	176 mg/day or 607 mg/g of creatinine, in xanthinuria.
Homogentisic acid	None. <sup>24</sup>	Up to gram quantities in alkaptonuria. <sup>24</sup>
Cystine	40 to 80 mg/day in adult. <sup>25</sup>	0.5 to 1.0 gm/day in cystinuria. <sup>25</sup>

TABLE 3. *Presumptive chemical tests for identification of urinary calculi*

Types of calculi	Test
Uric acid	Murexide test: evaporation of material with a few drops of concentrated nitric acid yields red color which turns purple on addition of ammonium or potassium hydroxide. <sup>27</sup>
Calcium	Urine proper contains increased calcium in hyperparathyroidism, which may be shown by Sulkowitch's reagent (buffered oxalate precipitates calcium producing a turbid suspension, read as zero to four plus). <sup>28</sup>
Calcium oxalate	Urine Sulkowitch reaction normal. Crystals do not dissolve in dilute acetic acid, saturated ammonia, or 60 per cent sodium hydroxide; dissolve in hydrochloric acid. <sup>19</sup> After clearing urine of protein and sediment by heat, acetic acid, and centrifugation, oxalate radical can be shown by adding one ml of 5% $\text{CaCl}_2$ to 2 ml of urine, followed by two drops of 5% acetic acid, and observing turbidity. <sup>29</sup>
Xanthine	Murexide test produces yellow color, purple on alkalization. <sup>27</sup>
Homogentisic acid	Urine proper turns brown on alkalization. Urine will reduce Benedict's reagent, and will turn transient blue color on dropwise addition of ferric chloride. <sup>24</sup>
Cystine	Heating calculus or concentrated urine produces hydrogen sulfide with characteristic odor and ability to darken lead acetate paper.

## CASE REPORTS

Case 1. Nineteen hours after an episode of pain in the left groin, a 27-year-old man passed a small, hard stone at the end of micturition. He was reassured by his physician, given the pellet as a "souvenir," and returned to his activities. Four months later colicky pain was experienced on the right side, and he entered the hospital.

Urinalysis revealed only a few red blood cells. A roentgenogram of the abdomen was interpreted as showing no stones, and the patient was to be discharged. The attending physician noted, however, that the report of the roentgenographic findings included a statement as to the "demineralization of visible osseous structures." Blood studies indicated elevated values of calcium and alkaline phosphatase and a reduced phosphorus level.

Exploration of the patient's neck, at another hospital, revealed a parathyroid adenoma. As an afterthought, analysis of the "souvenir" stone indicated that it was composed of almost pure calcium. By careful study of the stone, attention could have been directed to the diagnosis four months earlier.

Case 2. A 32-year-old man entered the hospital because of "shooting" right flank pain, which came on suddenly at night. Because of the severity of the attack, morphine was administered by the physician

called to see him. On admission, the patient's past history and physical examination were within normal limits. A centrifuged urine specimen was reported as showing microscopic hematuria, but successive urine specimens were not filtered to recover possible calculi. A roentgenogram of the abdomen and an intravenous pyelogram were both unrevealing. The possibility of a disorder of calcium metabolism was considered and appropriate blood studies ordered; these were within the normal range. Seven months after discharge from the hospital, a second bout of right flank pain was experienced. Calcium studies were again normal. However, careful straining of the urine was rewarded by the recovery of numerous cystine crystals. The patient was a cystinuric who had remained asymptomatic until his first bout of renal calculus. The elimination of one metabolic disease (hyperparathyroidism) from the differential diagnosis does not reduce the necessity of looking for other causes of the calculi.

### SUMMARY

The diagnosis of urinary lithiasis does not end the physician's diagnostic responsibility. It is incumbent upon him to determine if a metabolic disease has contributed to the formation of the stone.

Calculi (uric acid, calcium, calcium oxalate, xanthine, homogentisic acid, cystine) that may be due to a fundamental metabolic disorder was discussed. Techniques of investigation of the nature of the calculus and of the underlying defect are outlined.

A high index of suspicion, plus a systematic investigation by means of a specific history, urine straining, examination of the calculus, roentgenogram of the abdomen, and appropriate blood studies, may be rewarded by the uncovering of a metabolic defect.

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*The only equipment lack in the modern hospital? Somebody to meet you at the entrance with a handshake!*

—Martin T. Fischer

# TUMORS OF THE TESTIS

CLAUDE C. DODSON, *Colonel, MC, USA*

JOHN A. ISHERWOOD, *Colonel, MC, USA*

**T**HE PURPOSE of this article is to present the treatment of tumors of the testis as utilized by the authors, as well as to present a report of cases at this hospital. The cause of tumors of the testis is unknown. Although many writers have tried to associate them with trauma and have postulated other causes and while trauma may be the cause for their more rapid metastasis, we believe that it is not associated with the origin. In military medicine, most of the patients with this condition are seen in the 25- to 34-year age group. Most deaths occur within two years of the initial diagnosis.

## CLASSIFICATIONS

For the purpose of discussion, we may divide primary malignant testicular growths into germinal and nongerminal cells. Those that develop in the totipotent germ cell compose 95 per cent, and those that develop from the nongerminal cells of Sertoli, interstitial, and stroma cells compose approximately 5 per cent. Melicow<sup>1</sup> classified germinal tumors based on the postulates that (1) seminoma is a tumor in which the germ cells have retained their intranuclear trigerminal potential and (2) embryonal carcinoma, teratocarcinoma, and adult teratoma are a family of tumors in which the germ cells have released the intranuclear trigerminal potential. Mixed germinal tumors are not uncommon and therefore we believe that these postulates help to explain the occasional discrepancies between the type of the primary tumor and its metastasis.

We believe that the classification as given by Melicow is too detailed to be of value as a treatment index and have preferred the classification of Friedmar and Moore.<sup>2</sup> They grouped the tumors into the four fundamental structural patterns of (1) seminoma; (2) embryonal carcinoma including chorioepithelioma; (3) teratocarcinoma; and (4) teratoma, plus interstitial cell tumors.

In discussing clinical manifestations, the usual complaint is a unilateral testicular swelling. In seminoma, this is usually painless, while in embryonal and teratocarcinoma there may be local pain and tenderness. Caution must be taken in those pa-

tients with pain and discomfort that they are not treated for a benign condition such as epididymitis. Heaviness felt on examination is usually associated with testicular tumor.

On examination a mass is palpable, varying in size, position, and regularity. Any scrotal mass which cannot be identified positively, regardless of size, shape, and position, should be investigated surgically through a high inguinal incision, and in the majority of cases, a rubber-shod, Doyen-type clamp should be applied to the proximal cord prior to delivery of the testicle. An increase in gonadotropins occurs in from 20 to 30 per cent of patients with testicular tumors. This frequently is of value, diagnostically and prognostically, particularly in chorioepithelioma.

The pure seminoma on microscopic examination consists of sheets of fairly large, usually oval cells, with prominent, well-staining nuclei. If there is any variation from this, such as a tendency to form rosettes or, in other words, glandular-appearing clumps of cells, we do not consider it a pure seminoma and treat it as we would an embryonal carcinoma. Tumors varying between this pattern and the adult tissue pattern seen in teratocarcinoma and teratoma, we classify as embryonal carcinoma. If cytotrophoblasts and syncytiotrophoblasts are present in any of the before-mentioned tumors, we consider them to be chorioepithelioma, and anticipate the prognosis to be that of the most malignant component present.

### TREATMENT

*Pure seminoma.* Treatment consists of high orchiectomy (inguinal orchiectomy) and x-ray therapy. This latter is given through 4 abdominal (2 anterior and 2 posterior opposing portals), 1 inguinal, 2 mediastinal (anterior and posterior) and 2 left supraclavicular portals (anterior and posterior). Approximately 2400 r in air is given to the inguinal portal; 3000 to 3600 r in air to each abdominal portal; 3000 r in air to the anterior and posterior mediastinal portals; and 2400 r in air to each left supraclavicular portal, front and back. Treatment factors are 200 kv; 15 ma.; focus-skin distance, 50 cm; and half-value layer, 1.25 mm copper.

*Embryonal carcinoma.* High orchiectomy with radical node dissection is done, and x-ray therapy is given approximately the same as in the seminoma, except that we give these patients as near to 3600 r as possible in air through all portals in the abdominal area, because it was shown by Friedman and Moore and Lewis<sup>3</sup> that ordinarily this tumor will respond to approximately 3200 r in air, tumor dose.

*Teratocarcinoma.* High orchiectomy with radical node dissection is used and x-ray therapy is given only if the nodes are positive.



TABLE 1. Patients with tumors of the testis  
4-year (February 1952) and 8-year (February 1956) comparisons

Type of tumor	Number of patients		Average age on initial diagnosis (years)	Treatment			Radical node resection		History of trauma	Average survival following diagnosis and treatment (months)	Longest survival (months)
	Alive	Dead		Surgical	X-ray	Both	Positive	Negative			
Seminoma February 1952	14	—	29	—	—	14	1	5	4	30	54
	17	—	32	—	7	10	—	6	2	54	103
Embryonal carcinoma February 1952	10	—	28	—	—	10	6	1	—	15.5	43
	—	11	33	—	—	9	2	—	3	10.0	18
	7	—	25	—	—	7	4	3	—	47	71
	—	26	30	2	—	24	18	—	4	9	34
Choriocarcinoma February 1956	—	1	32	1	—	—	—	—	—	2	—
	—	3	31	1	—	2	1	—	—	6	15
Teratocarcinoma February 1952	10	—	23	—	—	10	1	5	3	25	47
	—	10	27	—	—	9	1	—	1	10	26
February 1956	19	—	24	—	—	15	5	12	3	50	88
	—	12	28	—	1	11	3	1	1	9	26
Interstitial cell February 1956	2	—	23	2	—	—	—	—	—	35	36

*Teratoma*. These are treated the same as teratocarcinoma.

In the *nongerminial* tumors such as *interstitial cell tumors*, only a high orchiectomy is performed. We do not believe a node dissection is indicated even though one group<sup>2</sup> found 7 cases of metastasis in 42 patients inasmuch as our own experience and that of Lewis has been contrary to this.

*Lymphosarcoma*, of which we have seen two cases in the last three years, is treated with high orchiectomy plus x-ray therapy only if there are metastatic lesions.

### SURVIVAL RATES

The five-year survival rate at this hospital with this regimen for patients with seminoma has been 100 per cent. Other clinics have given a rate of from 80 to 90 per cent. The survival rate in cases of embryonal carcinoma at this hospital has fallen. Four years ago we could have reported a survival rate as high as 45 per cent, but a more recent survey has shown it to be 21.2 per cent. The teratocarcinoma survival rate is about 60 per cent; for chorioepithelioma, no survivals; and for adult teratoma and interstitial cell tumors the survival rates are 100 per cent.

Table 1 gives data on tumors of the testis treated at this hospital as of February 1952 and February 1956. There was a total of 102 patients with tumors of all types, the longest survival being eight and one-half years. It will be noted from this table that the results are continuing about the same except in embryonal carcinoma, in which the survival rate is found to have fallen to 21.2 per cent. This would seem to indicate that more extensive surgery, such as a thoraco-abdominal approach recommended by Leadbetter<sup>4</sup> and, in addition, bilateral dissection in the retroperitoneal area at the same sitting as recommended by Schwartz,<sup>5</sup> may be in order. We do not believe that any change in the present x-ray therapy will affect these results, as we have used both the 250 kv and million-volt machine in the past years. It would seem that the only answer in the highly malignant embryonal carcinoma is more radical surgery or earlier treatment.

### SUMMARY

In summary, we have briefly discussed tumors of the testis and presented the treatment we now use in tumors of the testis. Attention is directed to the treatment of embryonal carcinoma, which in our recent, as well as other series reviewed, shows a distressingly low survival rate. We have recently become advocates of more radical surgery in this group and hope to be able to report better results in that series at a later date.

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  3. Lewis, L. G.: Testis tumors; report on 250 cases. *J. Urol.* 59: 763-772, Apr. 1948.
  4. Leadbetter, W. F.: Treatment of testis tumors based on their pathologic behavior. *J. A. M. A.* 151: 275-280, Jan. 24, 1953.
  5. Schwartz, J. W.: Paper read at the Kimbrough Urological Seminar, Walter Reed Army Medical Center, Washington, D. C., Sept. 1955. Unpublished.
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## THE TEACHER

Something of this frame of mind is to be found in many of the teaching staff. They view their encounters with the students with weary resignation, and when they are over they retire with a sigh of relief to their important work in their dark little cubbyhole in the attic. Many of them have little patience with the crude problems evolved by lower intelligences, and when students approach them for enlightenment they may be testily rebuffed. Students are often annoying, and their examination scripts frequently indicate an effervescence of dullness hardly to be credited. Nevertheless it is our job to help and encourage them, just as they will in turn help and encourage patients; we lose nothing by being approachable, and they gain a great deal. One of the most important features of a good teacher is that the students should have free and ready access to him. In too many departments, particularly where the senior staff are much occupied with research or administration, they appear to the students as remote Olympians, momentarily descending from the heights to deliver a lecture or to administer an examination. To take one's difficulties to such a preceptor would savor of impropriety.

—D. C. SINCLAIR, M. D.  
*in Medical Students and Medical  
Sciences, Oxford University Press  
1955, p. 38*

# SOMNAMBULISM

## Psychiatric Interview Studies

CHESTER M. PIERCE, *Lieutenant, MC, USNR*

HARRY H. LIPCON, *Captain, MC, USN*

**F**REQUENTLY the somnambulist is found not to possess sufficient psychologic assets to warrant retention in the naval service. Less often, a sleepwalker is adjudged psychologically adequate, but then is obliged to remain at a shore station in a permanent limited duty status. The sleepwalker who fails to come to the attention of the Naval Medical Department is in incessant danger of serious accident, particularly at sea. Accordingly, the somnambulist represents an actual medical and legal hazard to the Navy. In addition, he theoretically is a personnel liability, because even while working in a restricted capacity he is apt to succumb to an injury causing lost man-hours. Also, since he is limited in duty, he is less likely to consider re-enlistment.

The present report is part of an exploratory study which was made in order to elucidate further channels for investigating the problem of immaturity with symptomatic habit reactions. This article deals with psychiatric interviews on sleepwalkers observed to be somnambulistic while in recruit training and reported, by social service reports from their home towns, to have been somnambulistic prior to enlistment. The work suggests that in some physiologically predisposed adolescent males, emotional stresses may precipitate a bout of somnambulism.

Two goals exist as over-all objectives in this pilot research: (1) to determine which recruits are rehabilitable for the naval service and (2) to discover any objective methods which would aid in the quicker detection of the nonrehabilitable recruit. Other reports by us outline the economic, morale, and training problems engendered by symptomatic immaturity reactions.<sup>1,2</sup> Inasmuch as those same reports described the material and method as well as criticized the limitations of the study, methodology now will be considered only in a cursory fashion.

### MATERIAL AND METHODS

Thirty-four recruit sleepwalkers, who appeared before a Naval Aptitude Board because of unsuitability for service, were com-

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Two goals exist as over-all objectives in this pilot research: (1) to determine which recruits are rehabilitable for the naval service and (2) to discover any objective methods which would aid in the quicker detection of the nonrehabilitable recruit. Other reports by us outline the economic, morale, and training problems engendered by symptomatic immaturity reactions.<sup>1,2</sup> Inasmuch as those same reports described the material and method as well as criticized the limitations of the study, methodology now will be considered only in a cursory fashion.

### MATERIAL AND METHODS

Thirty-four recruit sleepwalkers, who appeared before a Naval Aptitude Board because of unsuitability for service, were com-

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pared with 60 nonsomnambulistic electronic school students. All men were interviewed by the same examiner (CMP) for about 35 minutes. The examiner had at his disposal a questionnaire filled out by each sailor that indicated information germane to somnambulism. The medical officer also had perused the corpsmen's notes, medical records, social service data, and company commander reports on all the recruits interviewed.

In order to gather uniform material, the interviews were highly structured and demanded many direct questions. An aim was made only to locate group trends in regard to interpersonal adjustment, conation, interests, psychodynamic reactions and experiences, and attitudes toward sleepwalking. After prolonged contact with the subject (during physical and neurologic examinations, procurement of medical history and laboratory studies, completion of electroencephalographic studies and projective tests, and examination of the various documents) the clinical summation interview procured sufficient information for a diagnostic formulation on each person.

## RESULTS

At times in this report, quantitative data procured for comparative purposes in an identical manner from 60 enuretics will be introduced but not interpreted by statistical analysis. There were no detectable group differences in the manner in which the experimental and control subjects presented themselves or handled themselves in the interviews.

**Attitude Toward Sleepwalking.** Fifteen of the sleepwalkers expressed a fear of injury and 15 others expressed no concern over their habit. Typically, members of the former group volunteered, "I worry I might hurt myself," while those of the latter dismissed the difficulty by stating casually, "Oh, I never even think about it!" Two men when queried only indulged in a fantasy of wishing that they did not have the habit. One man noted the necessity of carefully putting away household articles, while another told of intense self-anger whenever he had sleepwalked.

The most characteristic attitudes about sleepwalking are either a dread of anticipated bodily injury as the result of an accident or a strong defense of indifference in regard to the symptom.

**Vocational Aspirations.** As shown in table 1, the homogeneous control group cherished superior conative values. The sleepwalkers were content to strive for a modest living standard through means which required no aggressivity or competitive effort on their part. Even those sleepwalkers expecting to farm or to go into business were doing so because they could be set up by a relative. The examiner believed that many sleepwalkers had intellectual and personality assets sufficient for continuing their education or becoming tradesmen.

TABLE 1. *Vocational aspirations of controls, sleepwalkers, and enuretics*

Future plans	Controls (60)		Sleepwalkers (34)		Enuretics (60)	
	No.	%	No.	%	No.	%
None	10	16.6	5	14.7	16	26.6
Professional	4	6.6	0	0.0	1	1.6
Skilled labor or continuance of education	46	76.6	9	26.4	23	38.3
Unskilled labor	0	0.0	11	32.3	12	20.0
Farming	0	0.0	7	20.5	8	13.3
Business	0	0.0	2	5.8	0	0.0

**Avocational Interests.** A wide spectrum of interests was displayed by the somnambulists who as a group pursued a fair number of hobbies (table 2). Psychodynamically, however, their hobbies subserve different sublimation needs. In the control group six men were photographers, while no somnambulist mentioned this hobby. In contrast to both the control and enuretic groups, no sleepwalker indulged in the hobby of wood carving or metal hammering.

**Sports.** It is of high statistical significance that, compared to the controls, sleepwalkers were uninterested in athletics (table 3) ( $\chi^2=11.11$ ,  $P<0.01$ ). In view of their good health and the cultural accent on sports interests in the adolescent male, this finding emphasizes the lack of narcissism and aggression implied in the somnambulist's vocational and avocational inclinations.

TABLE 2. *Hobbies of controls, sleepwalkers, and enuretics*

Hobby	Controls (60)	Sleepwalkers (34)	Enuretics (60)
None	19	15	28
Outdoor recreation	15	9	10
Mechanics	10	6	11
Crafts	10	4	3
Modeling	11	3	3
Music	5	2	2
Electronics	9	0	0
Collecting	7	1	2
Total	67	25	31

**Neuropathic Traits.** There was no statistical significance between the groups in their history of nailbiting, thumbsucking, stammering, or stuttering. Men in the control group were prone to have dreams in which they were engaged in sexual intercourse. Usually the subject dreamed of a beautiful stranger about his own age.



TABLE 3. *Athletic interests of controls, sleepwalkers, and enuretics*

Athletic interest	Controls (60)		Sleepwalkers (34)		Enuretics (60)	
	No.	%	No.	%	No.	%
No interest	18	30.0	23	67.6	16	26.6
Moderate (some participation in organized athletics and some general knowledge about sports and sports events)	12	20.0	6	17.6	13	21.6
Active (intensification of above)	30	50.0	5	14.7	31	51.6

Fifteen of the sleepwalkers and 12 of the controls had had temper tantrums ( $\chi^2=4.96$ ,  $P<0.05$ ). Twenty-two of the sleepwalkers and 20 of the controls had suffered periodic nightmares ( $\chi^2=7.34$ ,  $P<0.01$ ). Twenty-one of the sleepwalkers and 17 of the controls had had a problem of enuresis ( $\chi^2=8.86$ ,  $P<0.01$ ). One sleepwalker had attacks of sleep paralysis but no history to suggest narcolepsy or cataplexy.

Sixteen of the sleepwalkers and 11 of the controls gave a history of acrophobia ( $\chi^2=7.31$ ,  $P<0.01$ ). Many other phobic reactions were discovered which were common to both groups, including nyctophobia, aquaphobia, agoraphobia, hematophobia, astrophobia, and claustrophobia. Three sleepwalkers had a cardiophobia and one had a pyrophobia. One control had an electrophobia.

Statistical pertinence is found in the experimental group's history of acrophobia, temper tantrums, enuresis, and nightmares. The wish-fulfilling dreams of the controls are thought to represent more suppressed attitudes toward overt sexual activity.

**Adjustive Capacity.** The method of estimation of adjustment and some reasons for the relatively poor adjustment of the controls have been recorded.<sup>2</sup> The experimental group of sleepwalkers is seen to fare well when compared with the other groups (table 4). In regard to their military adjustment, many of the sleepwalkers had obtained satisfactory or above-average company commander reports and related so well in the interview and while under observation in the neuropsychiatric unit that it was surprising that these same men verbalized such strong dissatisfaction for further service.

**Sleepwalking Factors.** Twenty sleepwalkers (58.8 per cent) indicated "lifelong" somnambulism. The remaining 14 (41.2 per cent) began to sleepwalk at an average age of 10.3 years, with onset ranging from 7 to 15 years.

TABLE 4. *Adjustments of controls, sleepwalkers, and enuretics*

Area of adjustment	Controls (per cent)	Sleepwalkers (per cent)	Enuretics (per cent)
Interpersonal relations estimated as less than adequate	26.7	20.1	35.0
School adjustment estimated as less than adequate	35.0	23.5	65.0
Service adjustment estimated as less than adequate	35.0	76.5	78.3
Claims to have had intercourse	53.3	70.6	66.7

In nine cases (26.5 per cent) emotional experiences appeared to have precipitated the first episode of sleepwalking. Three men began their habit upon separation from their mother. Two men started immediately after the birth of a sibling (one male sibling, one female). One of these men had received a lecture on the origin of babies, during which time his mother deliberately exposed herself and made incidental but dramatic commentary on the chronic physical anguish she suffered as a result of a burn involving her chest, back, and buttocks. Another man, rachitic in infancy, developed an ocular paresis which interfered with interpersonal relations at school. He became increasingly shy and began to daydream rather than attend to his recitations. As a result he soon concluded that failure of the fourth grade was imminent. He "worried" excessively about his parents' response to his failure, and in this setting he first began to sleepwalk. One man began to sleepwalk shortly after conscious realization of secondary gains a sibling had achieved through this habit. One subject suffered a skull fracture, and in addition the attending doctors discovered he had Bright's disease. After hospitalization this man began to sleepwalk when his parents made him sleep in their room. One man began to sleepwalk following the death of a parent.

Twenty-four somnambulists (70.5 per cent) believed that apprehension and preoccupation concerning the future, past grievances, or finances would bring on an episode of sleepwalking. Six (17.6 per cent) noted that exertion would increase the probability of sleepwalking. Three (8.8 per cent) stated that unusual noises would cause them to sleepwalk. One recruit related sleepwalking spells to long automobile rides, and another claimed that sleepwalking followed ingestion of green foods. Six (17.6 per cent) knew of no situation which would induce an episode of sleepwalking.

A dream, usually terrifying, was frequently a part of the actual sleepwalking in 10 recruits (29.4 per cent). Six recruits (17.6 per cent) made spontaneous mention of déjà vu phenomena occurring during somnambulistic bouts. Two recruits (5.8 per cent) were destructively violent when sleepwalking. Several somnambulists told of hearing voices during their sleep. There was no spontaneous reference to olfactory sensation. In only one man was there a history of a dissociative state. There were no cases of Kleine-Levin syndrome.

In most cases a sleepwalker, over the years of his perambulations, had wandered through his whole house. Very seldom did a somnambulist confine his sleepwalking to a particular location in his home. Only three (8.8 per cent) routinely went to their parents' room. Eleven (32.4 per cent) had walked out of the house while asleep. Eight (23.5 per cent) often walked to the bathroom in order to urinate. Five of these men were enuretic. Three (8.8 per cent) walked to the kitchen where they prepared a nocturnal repast. Interestingly, these recruits would sleepwalk following arguments with their parents which caused "worry" when they retired.

Despite the constant fear of injury, no one in this series had incurred serious injury while sleepwalking. In fact, only five (14.7 per cent) could recall any injury sustained while asleep.

Usually, the recruit awakened himself from his sleepwalking or would infer sleepwalking because on arising he would not be in his own bed. Only one admitted that he had ever awakened in his mother's bed. One other recruit often awakened in a brother's bed. Generally, the sleepwalker went to a vacant bed, chair, or couch. Sometimes he was observed silently by family members who would tell him about his sleepwalking the following day. At other times a parent, never a sibling, would see the sleepwalker safely into bed. Sometimes the displacement of familiar objects from their customary position would provide the only clue to the subject's perambulations. For instance, a man might awaken and be unable to locate his keys or his bathrobe.

Twenty (58.8 per cent) of the recruits slept by themselves in the year preceding entrance into the Navy. One other slept alone, but in his parents' room because of their concern for his safety. Eight (23.5 per cent) slept with a sibling. Three of these siblings also were sleepwalkers. Four slept with their wives. One slept with four other siblings.

**Psychogenetic Dynamics.** The only area of investigation showing statistical pertinence in this series (table 5) is that indicating chronic ill health in the parents of the sleepwalkers. Protracted illness in a parent imposed many psychologic and socioeconomic burdens on the experimental group.

It was found that one half of the 16 parents of sleepwalkers who had chronic degenerative disease suffered from cancer or chronic cardiac illness. Over one fourth of the parents with chronic ill health had disabling musculoskeletal disease. Most of the remaining parents in this group had progressive mental illness. These considerations, when coupled with the trend of propensity to deaths from gastro-intestinal tract cancer, suggest that the parents of sleepwalkers may be physiologically "older than their stated age."

By the age of 10 years nearly 30 per cent of all the sleepwalkers were separated from their parents or were living in a home where a parent was incapacitated through chronic illness.

**Diagnosis.** Except for the men who are better described as psychopathic personalities,<sup>3</sup> diagnostic formulations (table 6) were made in accordance with the procedure outlined in the Joint Armed Forces Psychiatric Nomenclature.<sup>4</sup> In those instances of mental deficiency as determined by psychometric examination, a predominating character defect was made the primary diagnostic consideration.

In this study nearly one half of the sleepwalkers depicted the diagnostic complex of passive aggressive-passive dependent. The remaining men received a wide variety of diagnoses.

## DISCUSSION

Two characteristics are outstanding in the recruit somnambulist who is discharged from the service because of unsuitability. First of all, he is found to have made a seemingly adequate life adjustment; secondly, he is found to make use of strong repressive mechanisms successfully in many areas. These two findings are mutually dependent and account for the discovery that the sleepwalker is able to verbalize no emotional distress at situations in his life that ordinarily might be expected to provoke charged affect. In reality, however, the sleepwalker's adequate adjustment is spurious, and like the facade of emotional tranquility, can best be interpreted in terms of psychodynamics. The dynamic interpretation offers clues both to the described behavior and to the symptomatic habit reaction of somnambulism.

To combat a lack of self-confidence, the sleepwalker routinely performs in a socially acceptable manner so as not to draw attention to his deficiencies. As a result of this overcompensatory striving the somnambulist partially obliterates a basic (and probably conscious) feeling of personal inadequacy. Thus it is that the sleepwalker attains satisfactory function through modest ambitions, over-conformity, and avoidance of known pressure situations such as sports activity. He is so skillful in this achievement that to the doctor and to the military officer it is

often a surprise that this man has been unable to adapt to the service. The application of minimal pressure is sufficient to disturb the delicate equilibrium in which the sleepwalker has

TABLE 5. *Dynamic factors in controls, sleepwalkers, and enuretics*

Dynamic factor	Controls (60)	Sleepwalkers (34)	Enuretics (60)
Father regarded as authoritarian	26	12	22
Open conflict with father	10	2	12
Father physically abusive	7	1	10
Father regarded as alcoholic	10	4	15
Mother regarded as authoritarian	6	3	5
Open conflict with mother	8	2	1
Mother regarded as seductive	7	0	15
Father verbalized suspicions of mother's fidelity	3	1	8
Subject was favorite of father or mother	4	3	4
Subject was favorite of both parents	1	1	3
Evidence of severe sibling rivalry	7	3	23
Parents regarded as strict	2	7	13
Parents regarded as religious	14	12	12
Alleged idyllic home situation	36	21	31
Number of parents regarded to be in chronic ill health	4	16*	26
Reared in a broken home (through death, desertion, divorce, or separation by age 10)	16	7	14
Verbalizes martyrdom to family	0	2	5
Number of married men	2	4	4
Verbalizes a belief that wife is unfaithful	0	0	4
Verbalizes that a divorce is being seriously considered	0	0	3
Average age of living mothers	48.7	44.3	43.0
Average age of living fathers	49.7	49.2	47.9

TABLE 5. *Dynamic factors in controls, sleepwalkers, and enuretics*  
—Continued

Dynamic factor	Controls (60)	Sleepwalkers (34)	Enuretics (60)
Average age of deceased parents	44.4	49.5	39.6
Average age of subject when parent died	7.7	12.3	6.1
Number of deceased parents	7	6	7
Number of deceased parents who died from cancer of the gastrointestinal tract	1	4	1

\*Of statistical significance. ( $\chi^2=18.98$ ,  $P<0.01$ )TABLE 6. *Diagnoses of controls, sleepwalkers, and enuretics*

Diagnosis	Controls (60)		Sleepwalkers (34)		Enuretics (60)	
	No.	%	No.	%	No.	%
Without psychiatric diagnosis	27	45.0	6	17.6	9	15.0
Passive aggressive—passive dependent	18	30.0	16	47.0	25	41.6
Inadequate personality	0	0.0	2	5.8	7	11.6
Psychopathic personality	2	3.3	1	2.9	2	3.3
Schizoid personality	12	20.0	3	8.8	9	15.0
Schizophrenia	1	1.6	2	5.8	2	3.3
Obsessive-compulsive neurosis	0	0.0	1	2.9	2	3.3
Emotional instability reaction	0	0.0	2	5.8	3	5.0
Aggressive reaction	0	0.0	1	2.9	1	1.6

made his pseudo-adjustment. With additional stress the sleepwalker withers and acts the role of the little boy who "quits and takes his ball and goes home." After such humiliation the sleepwalker resorts to "worry" and it is at this time that an episode of sleepwalking is likely to occur.

Specifically, the sleepwalking itself helps to solve a particular emotional problem without danger of insult to the ego. The sleepwalking act, generally, offers temporary amelioration of a knotty oedipal problem, which is a factor in nearly all sleepwalkers and may be crucial in sustaining the feeling of inadequacy. The same factor generates the pseudo-adjustment and forces the need for repressive mechanisms.

In our subjects sleepwalking diminished the intensity of particular problems and provided a safe outlet for anxiety about future events or the need to retaliate for feeling angered.

slighted. Sometimes the specific act seemed to thwart overt aggression and thereby supplied the sleepwalker with safety from retribution by an adversary. Several illustrative cases may be cited. For instance, one recruit went to bed worried about probable accumulation of demerits because of dirty clothing. That night he was observed washing his clothes while asleep. Another recruit worried about his insignificant position in the company. In the Navy his sleepwalking episodes were accompanied by an auditory illusion that his name was being blared out on a loud-speaker. A third recruit walked in his sleep after worry over his failure, during a liberty, to accept a challenge to fight a love rival who outweighed him by 30 pounds. Many examples of this sort of problem solving were given by recruits who had obtained insight into the nature of their sleepwalking.

There were other instances of problem solving in which no insight developed. In the Navy it is not uncommon to see a man in an anxiety state, suggestive of homosexual panic, following sleepwalking. If he has frequently walked in his sleep, it is at first difficult to understand the anxiety. When further history is obtained, it is found that the man developed his anxiety after sleepwalking to another man's bunk or waking up wearing another man's pants. Cases of this type demonstrate an attempt to solve the problem of unacceptable, repressed ideation that is gaining consciousness.

At home, sleepwalking episodes often expressed a desire to get parental attention. The sleepwalker can tell of sleepwalking after planning consciously to protest exploitation by the family. A sleepwalking episode might result in walking away from a sibling (who never cared enough to awaken the patient even when he observed the sleepwalking). A man might walk to the kitchen while asleep in order to gratify oral longings after losing parental favor.

Since repression is so marked in these sleepwalkers it may be that sleepwalking episodes allow ambulation from incestuous desire and/or allow an acceptable excuse to receive the mother's attention. In this series of cases the recalled onset of sleepwalking about the period of oedipal latency coincided with the period during which many of the recruits became separated from their parents or became residents in a home where one parent was infirmed. This consideration aggravated the unresolved oedipal problem. Here too there are many examples, such as the case of the son of a crippled father, who slept with his mother throughout his childhood. He recalled that worrying about his father's ill health (while the father was sleeping in another room) would precede somnambulism. Another man would worry over being in the same household with his stepfather, since "I can't get used to the idea of a stepfather." Subsequent to intense worry on this subject, the patient would sleepwalk.

There are a host of physiologic factors operative in sleepwalkers which may be active at those times when emotional upsets are able to produce a bout of somnambulism. In this study many episodes of sleepwalking occurred when a man believed he was urinating (and in some cases he actually walked to the bathroom). The sleepwalker is more likely than the control to have an abnormal electroencephalogram, a history of enuresis, genito-urinary complaints, and a history of sleepwalking.<sup>2</sup> The sleepwalker's attacks are associated commonly with the phenomenon of déjà vu, auditory illusions, and terror or other violent emotion in a person with a childhood history of emotional lability. Accordingly, advances in neurophysiologic knowledge of the temporal lobe may clarify some questions concerning somnambulism. Also, besides showing the need for more knowledge of the metabolism of sleep, the findings of this study hint that acrophobia in the sleepwalker and degenerative diseases in his parents may be of biologic significance.

#### SUMMARY

Psychiatric interview studies were conducted on 34 sleepwalkers and 60 nonsomnambulistic controls. A significantly larger proportion of sleepwalkers have a history of enuresis, temper tantrums, nightmares, and acrophobia.

The sleepwalker is relatively uninterested in sports. He frequently began to sleepwalk around the time when one of his parents first suffered a chronic illness. Descriptively, the sleepwalker shows a pseudo-adjustment and relies upon strong repressive defenses. Psychologically, the sleepwalking episodes represent an attempt to solve problems through safe channels and an attempt to resolve oedipal indecision. Physiologically, there is some suggestive evidence that in some cases the temporal lobe may be involved as the organic pathway for the precipitation of sleepwalking episodes following emotional duress.

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## SEBACEOUS CYST: A Modified Method for Surgical Excision

DANIEL C. BELDEN, *Commander, MC, USNR*

ONE of the problems in surgical excision of a sebaceous cyst is that of cyst-wall rupture or penetration. By using a modified technic, excellent results were obtained in a series of 25 patients. The cystic growth was excised without rupture of the wall, thereby achieving complete removal in every case. Follow-up of each patient for eight months revealed neither recurrence of the cyst nor infection in the operative site, and there was excellent scar formation with no secondary breakdown. A review of the recent literature fails to disclose any previous use of the particular technic employed.

Essentially, the treatment of a sebaceous cyst is concerned with one of the following phases of cyst formation: (1) noninfection or preinfection stage, (2) infection stage, and (3) postinfection or healed stage.

In the *noninfection stage*, the treatment of choice is surgical excision. Where the overlying skin is thick, the usual technic for excising such cysts may be used. The incision is made directly over the dome of the cyst, following the natural skin lines to minimize scar formation. If the mass is sufficiently large to produce skin redundancy, an elliptical incision is made over the dome, leaving a portion of skin attached to the cyst wall to be removed with it. The incision is carried down to the cyst wall; then by careful dissection the mass is extruded from its bed and removed. Should the overlying skin be extremely thin, however, then the modified incision described below may give much better results.

In the *infection stage*, the treatment of choice is incising and emptying the cyst, allowing healing by granulation.

In the *postinfection or healed stage*, if incision and drainage have been performed previously, the incisional scar is usually directly over the cystic swelling, the covering skin now being paper thin and firmly adherent to the cyst wall. There also are previously infected but now noninfectious cysts which, though never incised, have perforated spontaneously. Frequently these

too have a paper-thin covering. To attempt incision directly over the mass in these cases and expect an intact cystic sac is overly optimistic. At best, it is extremely difficult to dissect out a thin-walled sac, even a noninfected one, without rupturing it; and it is essential to remove the cyst in its entirety because any portion of the sebaceous-secreting epithelial lining that is left behind may cause the cyst to re-form.

Should the cyst be ruptured by accident and have to be removed piecemeal, every effort must be made to clean out all grossly apparent cystic wall remnants. Occasionally, cauterization with carbolic acid<sup>1</sup> or silver nitrate may be used, but I believe that this causes excessive tissue damage with a greater possibility of postoperative inflammatory reaction or infection, or both. The solution, therefore, is removal of the sebaceous cyst, intact. To this end, I have utilized a procedure for excising the entire cyst that minimizes breakage of the cyst wall. The procedure is used primarily for cysts with extremely thin covering, where incision into the thinned-out, darkened skin directly over the mass would almost invariably result in penetration of the cyst cavity.

#### TECHNIC

After local infiltration of 1 per cent procaine circumscribing the cyst area, a semilunar incision, made around one-half of the periphery of the cyst (fig. 1), is carried down to the subcutaneous fatty tissue. With blunt scissor dissection, the cleavage plane is obtained and extended to both limits of the incision (fig. 2). The



Figure 1

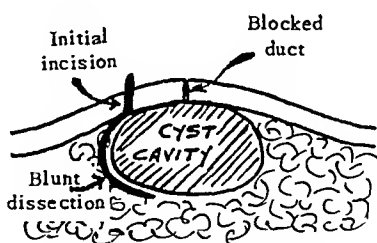


Figure 2

free edge of skin attached to the underlying cyst is grasped with Allis' forceps and everted, thus further exposing the cleavage plane to be followed. As the cyst is everted still more, the dissection is carried out in close approximation to the cyst wall until it approaches the under surface of the skin (fig. 3). Then, depending on the amount of redundancy of skin caused by enlargement of the cyst, a second semilunar incision is made in the skin, matching the initial incision in direction, but with opposite convexity (fig. 4). This allows a portion of the attached redundancy to come away with the cyst, and affords a clean, flattened surface for healing.

The walls of the cavity are approximated with No. 0000 plain catgut sutures and the skin is closed with interrupted No. 0000 silk mattress sutures (fig. 5). A pressure dressing is applied, with instructions to the patient to apply gentle digital pressure to the operative area several times daily to prevent subcutaneous venous bleeding postoperatively. The sutures are removed in from four to six days.

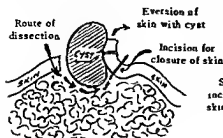


Figure 3



Figure 4



Figure 5

### SUMMARY

A series of 25 patients were treated for the removal of sebaceous cysts using a modified technic to ensure complete excision of cystic structure. None of the patients had a recurrence or post-operative infection, and discomfort was minimal. The modification described is primarily intended for removal of sebaceous cysts covered by extremely thin skin, where direct incision and dissection will almost invariably result in rupture of the cyst wall. It also minimizes the necessity for lengthy traumatic manipulation. Complete extirpation of sebaceous cysts is essential to prevent recurrence, and is made more nearly possible by the modification described.

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# AN OUTLINE FOR A NEW APPROACH TO THE PROBLEM OF HIGHWAY ACCIDENTS

FREDERICK L. MCGUIRE, *Lieutenant, MSC, USN*

**I**F THE military is to make significant advances toward the solution of its automobile accident problem, I believe that a new and basic definition of the problem itself is essential. The proper definition must come before the solution. This article outlines such a definition, together with its rationale, and presents a proposed plan of action.

It is not necessary to discuss in detail the problem with which the military is faced. In terms of deaths, persons injured, money lost, lessened economic production, and lowered military efficiency, automobile accidents are one of our most serious social and economic problems. The tragedy of a preventable manpower loss that is greater than that incurred in all of our wars combined demands the attention of all of us, not only as professional people but also as responsible members of the military community.

## THE PRESENT DILEMMA

It is my belief that we have achieved a stalemate in our attempts to lower the accident rate. Our current technics are based upon academic principles, and their effect has reached a point of diminishing returns. If we were suddenly blessed with a great increase in money and talent and simply doubled or redoubled our efforts with no change in philosophy or methodology, we would bring about no proportionate decrease in the accident rate. This is illustrated by the many intensive holiday safety campaigns we have waged in recent years, only to have them yield a less than significant decrease, or no decrease at all. Even the one notable exception, the Safe Driving Day campaigns, results in a decrease in accidents only for a single day and holds no promise of being effective over a longer period of time.

Some of our states have at various times waged vigorous and ambitious enforcement and educational programs in an attempt to change the course of their accident toll. While some of these efforts met with success at first, these state officials have since had the frustrating experience of watching the accident curve

slowly but surely rise toward its initial level. This is not to say that our present methods are worthless, for they are responsible for whatever progress we have made, and to abandon them without substitution would be disastrous. But we should reorganize our thinking about these methods in the expectation of producing new gains.

If we are to make significant advances in our accident programming we must do more than simply work harder—we must seek a different approach, a different definition of the problem. This definition, I believe, must be in terms of the personality, attitudes, and behavior traits of the individual drivers.

In all accidents on our highways, vehicle defects are listed as being involved less than 5 per cent of the time.<sup>1,2</sup> Also, there is no evidence to indicate that the design and engineering of the road and such factors as weather are the cause of more than a small percentage of the accident total. In addition, all evidence gathered over the past 30 years indicates that such physical factors as vision, hearing, reaction time, et cetera, play but a very small part in accident production.<sup>3</sup>

On the other hand there is mounting evidence that the basic personality of each driver is the largest single cause of accidents and plays an important part in those accidents where the first-mentioned factors can be isolated. That is to say, for example, that while vehicle defects may cause an accident, the tendency would be for certain personality groups to become involved because of their faulty attitudes toward such things as faulty brakes, poor headlights, et cetera. I found<sup>4</sup> that those individuals who tend to be accident-free tended to be more mature, more conservative, and more intellectual and thoughtful, to have a higher aspiration level, and to have had a happier and better adjusted childhood than did other drivers. This was true regardless of age, IQ, education, driving experience or mileage, or marital status. In his study, Tillman<sup>5</sup> showed that, when compared with a low-accident group, his group of accident repeaters were less stable, less mature, and irresponsible to the point of being borderline sociopaths.

The large difference between these groups and the significance of this difference have led me to hypothesize that at least 80 or 90 per cent of all automobile accidents that occur beyond chance are caused by the interplay between the basic personality of the driver and his driving environment. If this is true, any safety program designed according to the basic behavior traits of the accident-producing driver is pointing itself directly at the core of the problem instead of dissipating its energy by trying to reach all drivers, accident-producing or not, and reaching them

in terms of factors that do not necessarily influence their accident-producing behavior.

There is no logic in trying to impress a driver with the need for safe driving if he is already the type whose personality causes him to be cautious, conservative, and respectful of the rights and safety of others when he is behind the wheel. By the same token, there is no logic in spending time and money trying to impress a person with the need for respecting the driving rights of others if his personality dictates that he indulge in antisocial and asocial behavior. No simple plea to reason ever influenced the conduct, for example, of the confirmed sociopath.

### THE PERSONALITY GROUPS

This line of reasoning requires that in designing a safety program we first define the different personality groups we must reach and then devise special technics for influencing their behavior. I have listed the personality groups that I believe best define our driving population, together with some idea of what kind of approach is needed.

Group 1 consists of those individuals who routinely exhibit responsible, mature behavior. They respect the community and accept the responsibilities of citizenship. They are even tempered and display anger and aggression only when appropriate. They are effective in their jobs and are capable of establishing warm and satisfying human relationships. They become upset and engage in inappropriate behavior only as a result of sudden and unusual happenings and quickly recover. They are excellent driving risks.

It is mostly members of this group that are reached by our present academic-type programs. They are capable of responding to an appeal to the intellect, but need to know by what rules they are expected to behave. This is especially true of our teenagers, many of whom are emotionally mature, but whom the adult population has failed by not having given them proper instruction. We know that, regardless of personality, such factors as years of driving experience play a significant role in accident production.<sup>2</sup> Emotional maturity is correlated with age but is not necessarily dependent upon it.

Groups 2 through 5 suffer from emotional disorders characterized by inner struggles and discordant social relationships. Two essential features of such disorders are that they are precipitated by emotional stresses, conflicts, and frustrations and that they are most effectively treated by psychologic technics. They are not produced by physical disorders and do not respond to routine medical attention.

Although often incapacitating and disturbing to the person and his associates, the symptoms of these persons are such that compulsory hospitalization or segregation is unnecessary. A few voluntarily seek hospital treatment, but the majority live at home and usually continue with their customary business and social activities. Symptoms are extremely varied. They may include anxiety, depressed spirits, inability to concentrate or make decisions, memory disturbances, heightened irritability, morbid doubts, irrational fears, insomnia, and inability to enjoy normal social relations.

Physical symptoms may include loss of control over some motor and sensory functions, shortness of breath, persistent tension, fatigue, headaches, gastro-intestinal disturbances, heart irregularities, temperature imbalances, and all kinds of aches and pains. About 5 to 10 per cent of the population exhibit such symptoms at any given time and as many as 20 per cent of the people have shown or will show such reactions at critical moments in their lives. About 8.5 per cent of the general population may show even more extreme symptoms, which could include destructive or assaultive tendencies, bizarre thinking, motor disorders, speech or memory defects, extreme alcoholism, et cetera.

### THE NEUROTIC GROUPS

The members of group 2 are of a special type. They are either very mild cases or have developed techniques for controlling the display of any inappropriate behavior. They often pay the penalty for such control by increased physical symptoms and are unable to derive any real satisfactions from human relationships, but they do manage to be very law-abiding, socially conforming, and cautious in everything they do (*i. e.*, "Casper Milquetoast"). They too make excellent driving risks.

Group 3 members also have personal problems but have not been as able to control the outward expression of their symptoms as well as members of group 2. They are law-abiding and accept social responsibility, but their problems periodically get the best of them and for long periods of time they are unable to operate efficiently in their everyday living. During these periods they are likely to not see red lights, forget to look behind them before making turns, neglect to give signals, and generally forget to observe routine cautions. This makes them prone to incur accidents and violations, but they are likely to have excellent driving records while not under the disturbing influence of their problems.

Group 4 members are almost constantly at the mercy of their problems. They may be basically law-abiding, conservative

citizens, but may also constantly, and often unwittingly, engage in accident- and violation-producing behavior. They make very poor driving risks.

### THE SOCIOPATHS

Group 5 are those individuals known as sociopaths, sometimes referred to as psychopathic deviates. They exhibit disorders of an antisocial or asocial nature. They are constantly at odds with the world. They resent discipline and refuse to conform to accepted ethical and moral standards. They are thoughtless of the welfare of others, are devoid of honor and a sense of fair play, and experience no real remorse for their misdeeds. Their lives lack stability, direction, and tenacity of purpose. They change jobs frequently, and many lead a nomadic existence. They are generally described as cold, callous, shallow, cruel, infantile, and flighty in their moods. Many are ingratiating and have charming manners that enable them to make favorable impressions, some are aggressive and hard to get along with, others are weak, passive, and inadequate. Nearly all of them are selfish, stubborn, and egocentric.

About 1 per cent of the male population falls into this category. They are chronic traffic violators, and can be expected to have high accident records. They typically do not respond well even to intensive psychotherapy and cannot be expected to respond to less intense methods of education such as driver education or a modification thereof. There is some evidence that a large percentage of this group modify their behavior after the age of 35, especially if they have served a prison sentence (as in the case of civilians).

Members of group 5 should be screened from the driving population and their driving severely limited if not prohibited entirely. However, if such individuals do modify their behavior and become less of a threat on the highways after the age of 35 they deserve reconsideration at that time; perhaps a system of driving parole that would extend to these later years would be effective. Older individuals so screened from the driving population would have a much poorer prognosis and probably should be discriminated against for the rest of their driving lives. Laws prohibiting paroled convicts from driving a car have probably performed an unwitting service in the cause of highway safety and should be extended with that in mind. Fortunately, most members of group 5 are sooner or later separated from the armed services for various reasons.]

### THE PHYSICALLY DEFECTIVE

Members of group 6 exhibit several types of conditions, including epilepsy, diabetes, mental deficiency, and a variety of



physical conditions that are able, or potentially able, to produce unsafe driving behavior. However, they are all capable of falling into one of the other categories and must be treated individually.

About one out of 250 persons suffers from epilepsy. Obviously, these persons might make poor accident risks, although the risk varies according to type of illness, the degree of success in controlling it medically, and the individual's personality type. The driving potential of each diabetic depends upon the type of his disorder, the nature and frequency of medication required to control his symptoms, and his type of personality. About one million of the population are mentally deficient. Whether or not a mental defective is a driving hazard depends upon the particular personality which provides the context for the condition. The driving behavior of any given defective may fall into any of the other groups. However, he would not necessarily be amenable to the same approach of education as the other groups and so must be treated as an individual case in both diagnosis and treatment. It is probably no mistake to allow a defective to drive if he exhibits a good driving record and/or shows himself to be socially responsible and able to follow the rules of the road. Many such individuals make excellent drivers.

Obviously, these six groupings overlap, and any given individual may well be placed in more than one category at any given time. However, they serve as guides and should permit the effective placement of each driver for purposes of treatment.

### EDUCATION AND TREATMENT

The treatment or educational program outlined in table 1 is concerned primarily with the emotional makeup of the driver. An educational situation that is based upon good psychotherapeutic principles requires that each individual be given an opportunity to explore his own personality in a free and permissive fashion so that he can eventually reorganize his outlook on life to the point where his problems become less threatening and are less able to produce inefficient behavior.

The work would ordinarily be conducted in small groups and by professionally qualified personnel, a fact which is likely to be a big obstacle since such personnel are in short supply and practically none are presently engaged with the problem of highway accidents.

However, the basic principles of this approach can also be applied to the population at large by a well-conceived propaganda program. Such a program would have to be based mostly upon emotional values rather than intellectual. The use of reason not only is limited in its effectiveness when used as a means of mass communication, but it promises to reach mostly those individuals

TABLE 1. *Personality groups found among driving population, with expected driving behavior of each group and suggested method of treatment*

Group	Type	Expected driving record	Program of treatment
1	Well adjusted; are upset only rarely by transient events and recover quickly	Almost never have an accident or incur a violation	Driver education based on pedagogic principles
2	Have emotional problems, but are socially responsible and are under rigid self-control	Almost never have an accident or incur a violation	Driver education based on both academic and psychotherapeutic techniques
3	Socially responsible, but have emotional problems and are prone to upset for long periods of time	Will have periods of weeks or even months in which they are a poor accident and violation risk	Group psychotherapy with some driver education appended
4	Socially responsible, but have emotional problems and are prone to constant upset	Are rather poor accident and violation risks in spite of themselves	Group psychotherapy with some driver education appended
5	Have consistent tendencies to antisocial and a social behavior	Chronic violators who may also have a high accident rate	Prognosis extremely unfavorable; screen from group and limit driving privileges
6	Miscellaneous (epileptics, diabetics, mental defectives, etc.)	Behavior unpredictable; driving record may range from very poor to very good	Each case highly individual as to diagnosis and treatment; in absence of knowledge of each case, screen and limit driving privileges

who need it the least and who produce the fewest of our avoidable accidents (*i. e.*, groups 1 and 2).

The so-called emotional technics that I would advocate are available and very much in use today. Tons of soap are successfully sold to women who listen to daytime radio and television serials. These programs involve themselves less with plot than with problems that are close to the feelings of most American housewives. Among other things they deal with love, adventure, excitement, and many things either denied to or desired by the average housewife. Thus she becomes strongly identified with each serial and is emotionally "softened up" for the onslaught of the commercial in much the same fashion that a naval task force softens up an enemy beach before making an amphibious landing. The same technics are used in selling to children, who, for example, are encouraged to identify with some TV hero and who watch avidly while that hero uses or advocates the sponsor's product.

Many years ago it was a common saying among politicians that "if you wave the flag and quote the Bible you can be elected to any office." Obviously, they recognized the value of the emotional approach in influencing behavior of the masses. The same principles have been applied in advertising, fund-raising campaigns, and other attempts to produce a specific pattern of behavior in the public.

Thus we have two approaches to bringing about changes in the driving behavior of the public. One is a personal contact procedure based upon psychotherapeutic principles of education, and the other is one of mass communication based on the emotions and feelings of the public. It is obvious that they should be used together in order to be most effective, and that any approach based upon persuasion by reason and logic alone must be considered to have minimal effectiveness.

The first method can best be used within limited groups, such as truck drivers, taxi drivers, and military units. This would involve the screening of the most likely candidates for such psychotherapy already in the group, and the screening of new applicants. Among the former, treatment need be applied only to those who hold the best promise of responding and who cannot be discharged or shifted to nondriving positions. Among the latter there would be no need for treatment since they would not be accepted into the group if it could be avoided.

The second method is not only applicable to the general public, but can also be tailored to suit particular segments of the population. Since it is possible to better know the personality characteristics of a delimited group, we can develop special forms of mass media (*e. g.*, literature, conferences, safety cam-

paigns, et cetera) that are better suited to the emotions and feelings of the subgroups they are designed to reach. In such a situation the two methods would be closely interwoven.

### DISCUSSION

The technics I have outlined must await further planning and research before their details can be worked out. However, I believe that we now know enough to justify such an approach and that the basic principles of application are already available and ready for use. The development and testing of such an approach will require both funds and talent, both of which are in short supply. Also, once clinical psychologists and other specialists are assigned to this work they would require access to, and control over, large numbers of drivers. Such a situation is not available to most civilian agencies, but fortunately the military is able to offer these advantages to its researchers with practically no increase in present operating costs. Large Marine Corps and Army bases have thousands of men whose routine training duties make them sufficiently available to researchers so that the needed work can be carried out. During the period from 1953 to 1955 the Commandant of the Marine Corps and the Commanding Officer of Camp Lejeune were extremely co-operative and sympathetic to work in this field and, with a minimum of inconvenience and at no extra cost, were able to make available for research as many drivers of private vehicles as we could use.

Therefore, it would appear that the military, and especially the Department of the Navy, would be able to provide means for the development of a dynamic and increasingly effective program of highway safety that will be applicable to both military and civilian drivers. In such an event it can be expected that technics and methods will be forthcoming that will significantly lower the presently high rate of death and injury among our service personnel and at the same time offer new hope to our civilian colleagues.

### SUMMARY

An outline of a new approach to the problem of highway accidents is based on the premise that the largest single factor operating in the production of motor vehicle accidents is the personality of the drivers. Six general groups can be defined. It is believed that our present knowledge has advanced to the point where we can begin to develop a program that will diagnose and treat drivers on the basis of their particular personality patterns, and the proper procedures would seem to be personal contact based on psychotherapeutic principles and mass communication based on the emotional interests of the public.

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## THE DILEMMA

"The dilemma in which contemporary man of the West finds himself is unmistakable. Free societies recognize and favor individual differences. These are considered the sources of all progress. The center of gravity in free societies is the individual person. Society's function is to give maximum opportunity for self-expression and at the same time guard the members of society from infringing on one another's interest by insisting that everyone keep the accepted rules of the game. This type of system under favorable conditions, such as during the last 300 years of Western culture, through encouraging individual expression in the sciences, arts, and technology, can be highly productive. At the same time, because it accelerates social change and as a result complicates the problems of individual adjustments, it creates insecurity. Self-regulating mechanisms, such as the supply and demand principle in economics, no longer function smoothly, and the urge for central planning appears. Traditional value systems lose their categorical force and this throws individuals back to their own choices. This results in a flight from free choice and enterprise toward the security of steady jobs, preferably in large, depression-proof companies, or in state employment."

—FRANZ ALEXANDER, M. D.  
in *American Journal of Psychiatry*  
pp. 692-693, Mar. 1956



## Clinicopathologic Conference

Fitzsimons Army Hospital, Denver, Colo.\*

### EARACHE AND VERTIGO

**Summary of Clinical History.** A 29-year-old carpenter entered the hospital on 24 December because of pain in the right ear of two and one-half months' duration and a discharge from the ear for two months.

The onset of pain in the right ear was accompanied by malaise, myalgia, anorexia, a low-grade fever, and weight loss. The patient consulted a private physician, who treated him with sulfonamides and penicillin without any apparent toxic effects. Five weeks prior to admission his physician performed a myringotomy with resultant drainage of a small amount of blood and pus for two days. About one month prior to admission the patient noticed some difficulty in swallowing, and this continued until the time of admission. Three weeks later the ear was again opened with drainage of a slight amount of pus for one week. Ten days before admission it was opened a third time with minimal drainage. During the time from the onset of his illness until admission to the hospital the patient's weight fell from 150 to 120 pounds.

On Christmas, the day following admission, the patient went home on leave and ate lightly because of anorexia. Shortly after eating he developed vertigo consisting of a lateral to-and-fro movement. He reported back to the hospital on 26 December.

**Physical Examination.** On 26 December, examination disclosed a chronically ill, undernourished white man about the stated age

\*Maj. Gen. Martin E. Griffin, MC, USA, Commanding General. From the Pathology Service, Col. Howard A. Van Auker, MC, USA, Chief.

of 28 years. The caloric test showed slight depression on the right. There was an equivocal left nystagmus. The right ear drum was full and showed a slight bulge. There were no neurologic changes except for a slight unsteadiness on walking. A right Horner syndrome which had been present for about 48 hours was noted. Blood pressure was 120/80 mm Hg. There were no lesions of the skin. Examination of the heart, abdomen, and extremities was negative.

A roentgenogram of the chest on 26 December was reported as negative. Roentgenograms of the mastoid on 26 December showed acute inflammatory changes in the right mastoid region. The skull was otherwise normal. A subsequent roentgenogram of the mastoid on 14 January showed no change from the previous examination. Roentgenograms of the chest on 28 January, 8 March, and 29 March were negative.

**Laboratory Studies.** The only abnormal laboratory findings on admission were a white blood cell count of 13,500/ $\mu$ l with a normal differential, except that one differential showed 12 per cent eosinophils; however, several other hemograms were normal. The sedimentation rate went from 4 mm to 40 mm in February. Through January and February the urinalyses were normal, but on 1 March the urine specimens began to show casts and albumin. This persisted until the patient died. Shortly after the abnormal changes were noted the patient developed a hypertension from 170/100 to a peak of 190/130 mm Hg. Terminally, the systolic pressure began to decrease, going down to 140/130 mm Hg. The temperature, which was elevated from 100° to 102°F during the first month's hospitalization, gradually fell to 99.5°F during the last three months of the illness. The only other abnormal findings were an elevation of serum globulin to 4 g/100 ml with depression of the serum albumin to 2.7 g/100 ml with an albumin-globulin ratio of 0.7; initially the serum proteins and albumin-globulin ratio had been normal. Further laboratory studies included two spinal fluid examinations, 20 blood cultures, and numerous liver and kidney function tests. Blood chemistries at all times revealed normal CO<sub>2</sub>, combining power, nonprotein nitrogen, urea nitrogen, sodium, potassium, chloride, calcium, and phosphorus. No biopsy specimens were taken from muscles or liver.

**Course in Hospital.** Roentgenograms on admission showed an acute inflammation of the right mastoid. It was the opinion of the examiner that the symptoms were toxic manifestations of the mastoiditis, and that extension to the central nervous system by contiguity had not occurred. The diagnosis on admission was acute mastoiditis, right, suppurative, moderately severe, with possible episodes of labyrinthitis and toxic neurologic manifestations. The patient was treated with penicillin with some subsidence of the otalgia, malaise, fever, and neurologic symptoms.

On 8 January, however, he developed numbness of the left hand. Examination showed a slight hypesthesia, but pain sensation was intact. There was slight generalized muscular weakness of the left upper extremity with definite loss of apposition of the thumb and fingers. Within a day there was a similar involvement of the right hand, and a few days later both lower extremities were similarly affected. At that time the patient was seen by the neurologic consultant and diagnosed as having a peripheral polyneuritis on a toxic basis.

On 16 January he developed an irregular hemorrhagic area on the index finger of the right hand. During this time the patient developed a migratory polyarthrititis of the knees, ankles, and joints of the upper extremities. Two days later he developed redness of the left eye, which was diagnosed as an iridocyclitis by the Eye Department. From that time the patient had a steady progressive downhill course with increasing severity of the peripheral polyneuritis. The deep reflexes continued to decrease until finally the ankle reflexes were entirely absent. The muscular paralysis became more pronounced and the patient became unable to feed himself or do anything more than turn over in bed. He continued to show a steady, progressive weight loss.

The patient's skin appeared tanned, but he stated that his skin had been this color all his life and that there was no increase in pigmentation. At no time did he show any peripheral edema, although examination of the eyegrounds following development of the hypertension revealed blurring of the disk margin and tortuosity of the vessels with an increase in the light reflex. Several electrocardiograms showed a notched T wave in leads V<sub>2</sub> and V<sub>4</sub>. The patient gradually became very emaciated, dropping from a normal weight of 150 to 65 pounds terminally. At all times there was extreme weakness of the muscles and burning pain in all extremities. The last 10 days he developed moist rales throughout the lungs. At 1840 hours on 10 April, approximately 6 months after the onset of the disease, the patient quietly died.

The treatment in this case was purely empiric. The patient was given massive doses of vitamins parenterally; several courses of penicillin were administered, and blood transfusions were given on three occasions. Physiotherapy was instituted at the onset of the illness, but finally had to be discontinued because of the paresthesias. Papaverine hydrochloride was given parenterally, but had to be discontinued because of the pain associated with this and other parenteral therapy.

#### DISCUSSION

Doctor Auld:\* Doctor Sheedy, will you discuss the differential diagnosis, please?

\*Maj. David Auld, USAF (MC), Senior Resident in Pathology.



Doctor Sheedy:\* This patient became ill in September with pain in the region of the right ear, apparently an infectious process which perforated the drum. In retrospect he had malaise, myalgia, anorexia, low-grade fever, and weight loss. These are generalized symptoms that are nonspecific and unusual in an ear infection. That this was probably purulent is borne out by sulfa and penicillin which was given. He improved, but the process recurred in November, and at this time a myringotomy was done with evacuation of pus and blood. In December he had dysphagia. Could the dysphagia be the result of infection in the throat or is it indicative, in terms of the subsequent course, of some type of nervous system involvement? We don't know; it doesn't appear again in the protocol.

In December the patient had a second and a third myringotomy with pus again being obtained. During this period the patient lost 30 pounds in weight. Now this is considerable for what was an otherwise ordinary infection in the ear. This completes the first of three periods in this patient's course. He apparently was quite sick at that time and was admitted to the hospital for further investigation, and so begins his second phase.

At the time he came in, another group of symptoms are prominently mentioned and these all seem to be related to the nervous system and the gastro-intestinal tract. He had anorexia, lateral vertigo, and unsteady gait. People with vertigo can have disease of the labyrinth of the ear, vestibular nerve damage, or cerebellar or other types of brain disease. Findings of his physical examination were consistent with those in a severely ill patient. A caloric test was depressed on the right. Depression I assume indicates a positive test, and it would seem to implicate the ear, or at least the labyrinth, although again we can't say that dogmatically. He had questionable nystagmus to the left, but was the fast component to the left or to the right? While questionable and difficult to interpret it implies some type of cerebellar difficulty. He obviously had an ear infection. Has the infection now progressed to thrombosis of one of the important veins, or has the infectious process directly involved the brain? I don't believe that the latter is the case because there is no mention of localizing signs or meningismus, and subsequently two spinal taps were normal.

The patient also had a right Horner's syndrome and again this is difficult to localize. A Horner's syndrome can be due to many things: involvement of the brainstem itself, of the spinal cord, or particularly of the cervical sympathetics by a tumor, cervical rib, infection, or trauma. Pulmonary disease such as lung tumors has been known to cause this manifestation. His chest film was essentially negative, which would seem to rule out most of these causes, and so we are unable to state whether he has a cord or brain lesion. We are not given sufficient information, therefore, to make a neurologic differentiation. It is probable that this patient did have some type of brain damage.

\*Lt. Col. John A. Sheedy, MC, USA, Chief, General Medicine Service.



organ system. His neuritis was known to become worse, and at this time he had absent reflexes and, presumably, was more or less paralyzed. His weight loss progressed. On 28 January a repeat chest film was negative; during the month of February urinalyses were repeatedly negative and sedimentation rates varied from 4 to 50 mm.

In March, he entered his third and final phase of illness, and during this period we again see a change in the over-all clinical course, with new organ systems being added to the picture. Examination of the urine now showed casts, albumin, and red cells. Could this be an extension of a rheumatoid or rheumatic state, or does this imply renal disease itself? Certainly glomerulonephritis would be such a possibility, as would pyelonephritis. He did not have azotemia. He did have an elevated blood pressure on several occasions; in fact, it reached 190/130 mm Hg, which was within the limits of the very severe, malignant type and was accompanied by blurring of the optic disks and increased tortuosity of the vessels in the eyegrounds. Such a phenomenon is not uncommon in acute nephritis, and the blood pressure is frequently elevated. We cannot further classify the renal lesion except to include it as another system involved in this patient's illness.

His temperature was almost constantly elevated, from 100° to 102°F. Now if this patient had a murmur with the fever, we would have to consider subacute bacterial endocarditis. We are not told that he ever had a murmur. At any rate, the physicians who were taking care of him thought of this possibility because they obtained 20 blood cultures, all of which were negative. I don't believe that this patient's problem was one of uncontrollable bacteremia. The globulin was 4 g/100 ml with an albumin of 2.7 g/100 ml. This low albumin could result from loss through the urinary tract or poor nutritional intake. He was anorectic and he had a severe catabolic disease. Could this have been the result of some type of liver disease? We are told that his liver profile was normal, but on the other hand the liver is the site of manufacture of albumin and not necessarily of globulin. A reduction in albumin to this degree could very well implicate the liver as being a part of his total disease. We cannot exclude the contributory aspects of loss through the urinary tract or a poor nutritional status. Renal function tests were otherwise negative and are of no help to us. That for CO<sub>2</sub> was normal as were those for sodium, potassium, chlorides, calcium, and phosphorus. Frequently in the presence of renal disease low calcium, elevated phosphorus, and acidosis are seen.

An electrocardiogram showed notching of the T waves in leads V<sub>1</sub> and V<sub>4</sub>. This is a nonspecific sort of response and doesn't tell us much. It might imply that he had some vague or disseminated disease of the myocardium but otherwise is not diagnostic. It is stated very prominently that the skin was tan but that the patient was of a dark complexion. The skin is important here for several reasons. Did this tanning reflect vitamin deficiency? Did it reflect some involvement of the adrenal such as is frequently seen in Addison's disease? He did

not have any abnormality of sodium or potassium or chlorides and no hypotension, except terminally. There was no evidence of adrenal cortical deficiency. The other point that I want to make is that the skin, except for the hemorrhage mentioned previously, did not show any nodules, rashes, or anything else that could help us, either positively or negatively.

The patient continued to lose weight and he continued to go downhill. During the final portion of March another chest film was normal. It is interesting that the heart size apparently was normal in the presence of such a hypertension. During the month of April the patient had some type of pulmonary difficulty. Could it be involvement by some diffuse disease such as this patient appears to have had, or was this merely the terminal insult in a very cachectic patient? The patient may very well have had a pneumonitis, and I believe that the pulmonary disease occurred in the agonal phase of his illness.

In summary, we have a 29-year-old patient who had multiple system disease. He had involvement of the ear, nervous system, joints, skin, eye, kidney, cardiovascular system, and, questionably, the liver and the lungs. In an exercise such as this it is rather unpopular to make multiple major diagnoses. To explain such multiplicity, a collagen disease is suggested. Logue and Mullins,<sup>1</sup> in the 177 cases which they analyzed, reported the percentage incidence of the various manifestations of periarteritis nodosa. Of these manifestations, this patient had fever, leukocytosis, albuminuria, hypertension, neuritis, a rapid onset, weakness, weight loss, dyspnea, cough, emaciation, sensory involvement, arthritis, eosinophilia, purpura, central nervous system involvement, muscular soreness, visual disturbance, nausea, atrophy, and vertigo. There were very few other manifestations which our patient missed.

Zeek<sup>2</sup> has spent considerable time reviewing the historical aspects of this particular disease. She stated that the disease itself has been divided into three periods of progression or periods of study. It was originally described by Kussmaul and Maier<sup>3</sup> in 1866, and from the period 1866 to 1900 primary emphasis was on the pathologic demonstration of various organs involved. From 1900 to 1925, medicine generally was in the era of the search for focal infection, and this disease was subject to intensive investigation, but no causative agent could be demonstrated. From 1925 to the present time investigators have been busy in demonstrating various hypersensitivities or allergic causes for diseases, and this entity seems to fit, at least in the minds of many people, in this category.

It is interesting that the disease has been compared with many conditions, such as hypersensitivity angitis, allergic granulomatous angitis, rheumatic arteritis, and temporal arteritis, to mention but a few of the various conditions. In Kussmaul and Maier's original description symptoms such as chlorotic marasmus, polyneuritis, polymyositis, and

abdominal symptoms were enumerated as being characteristic of this entity.

Since this patient's illness began in the ear and since the neurologic aspects were a prominent part, I would like to review some of the work reported by McNeil, Burke, and Reingold.<sup>4</sup> Involvement of the nervous system is a well-known phenomenon in this disease. Lovshin and Kernohan<sup>5</sup> studied 29 cases and found that peripheral neuritis occurred at some time in the course of illness in 52 per cent of their patients. This was predominantly of the motor type, although sensory findings were also commonly seen. They felt that this was the result of occlusion of nutrient arteries and not due to the presence of some unknown toxin or other pathologic agent. The central nervous system was involved in 20 per cent of 300 cases reported by Foster and Malamud.<sup>6</sup> Nerve deafness was present in two of their individuals. Parker and Kernohan<sup>7</sup> also studied 16 cases at autopsy who had central nervous system involvement and demonstrated arterial lesions in 69 per cent.

Now I don't think that there is any other collagen disease which would give you the picture that this patient presented. We might mention lupus erythematosus disseminata, but the patient had no typical skin lesions. This disease is more common in females than in males, whereas periarteritis nodosa is more common in males; also, hypertension, although seen in terminal cases, is rather uncommon in lupus, and joint manifestations are more frequent. I admit that I can't rule out lupus entirely, but I think that the weight of evidence is certainly consistent with the fact that this patient had periarteritis nodosa with involvement of the systems as listed.

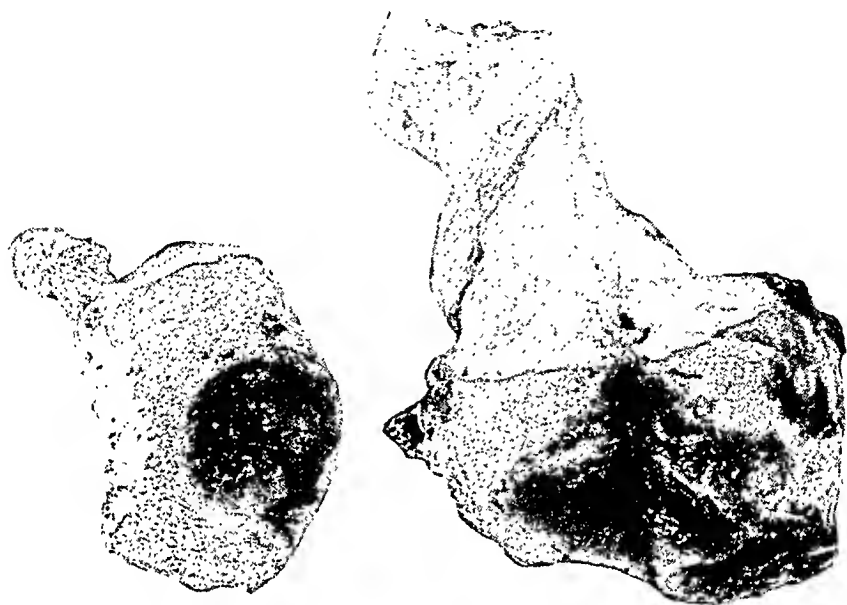
**Dr. Sheedy's diagnosis:**

**Periarteritis nodosa**

#### **PATHOLOGIC FINDINGS**

**Doctor Auld:** The external examination revealed an emaciated and dehydrated adult white man measuring 65 inches and weighing 66 pounds. On opening the chest the lungs were found to be wet and dark reddish-purple, and frothy fluid could be expressed from the cut surface. The heart was globular and weighed 270 grams, and the walls and papillary muscles were hypertrophied. The kidneys were scarred, and on cut section numerous areas of infarction could be found in both kidneys. A hemorrhagic cystic structure was found in the right testis and three or four were found in the left (fig. 1). The gastro-intestinal tract was most striking, and a number of small nodules could be found along the course of the mesenteric vessels and in the serosa (fig. 2). A hemorrhagic cavity measuring 2 by 3 cm was found in the right cerebrum just lateral to the lateral thalamic nucleus (fig. 3). Microscopic examination revealed a picture of subacute and chronic polyarteritis nodosa. The medium-sized vessels were involved in the heart, pancreas, adrenals, kidneys, prostate, testes, esophagus, stomach, mesentery, peripheral nerves, muscles, and fascia. A great deal of healing had

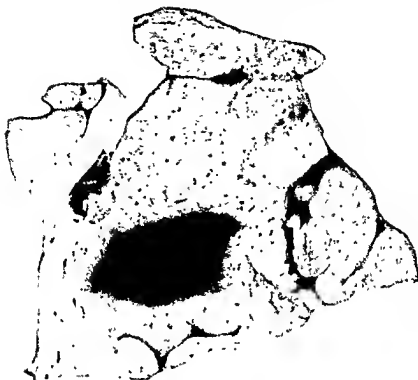
occurred, and in many places recanalization of the vessels was seen. A number of small aneurysms were found along the mesenteric arteries (fig. 4).



*Figure 1. Cut sections of testes revealing large hemorrhagic areas.*



*Figure 2. Section of ileum and attached mesentery, showing distribution of nodules along the mesenteric arteries.*

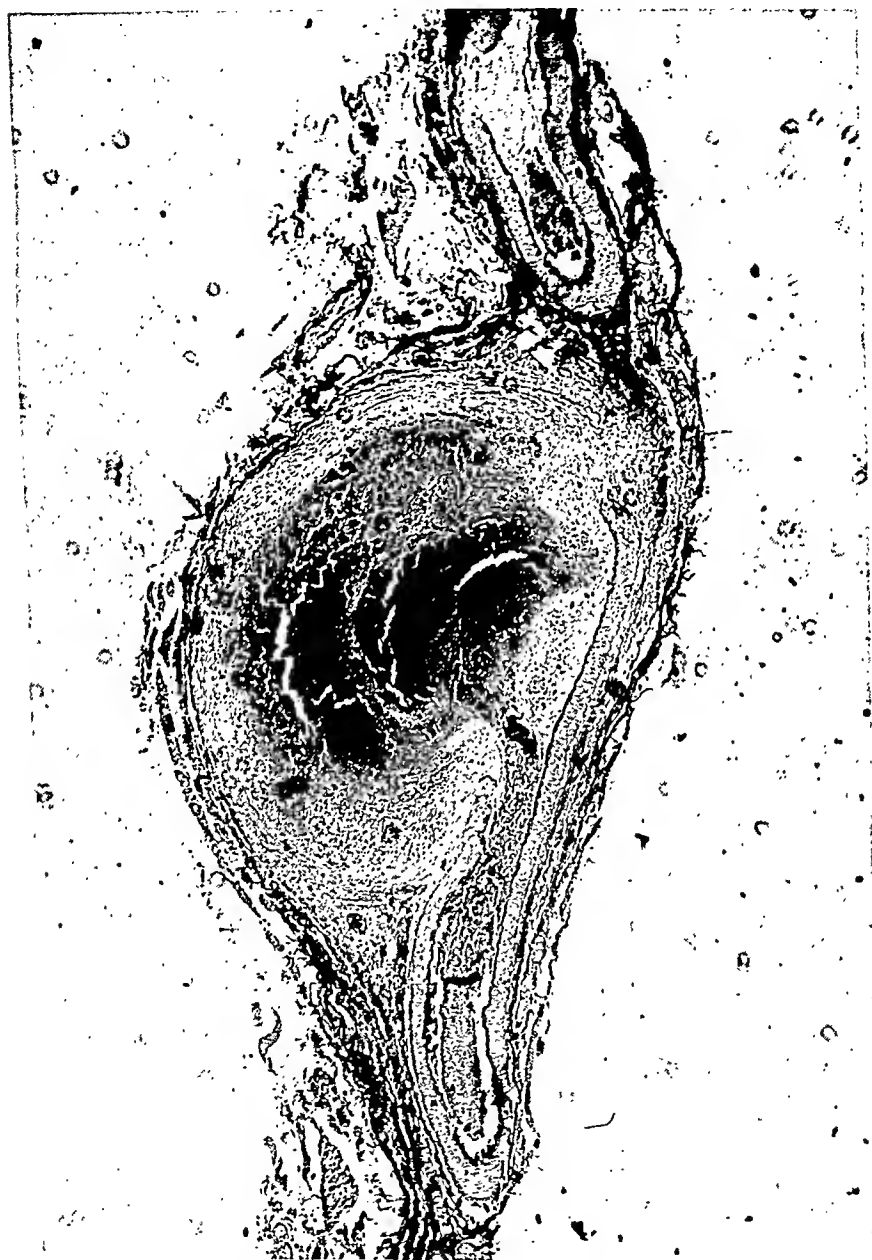


*Figure 3. Section of right cerebrum at level of lateral thalamic nucleus, showing hemorrhage.*

Polyarteritis nodosa is a generalized vascular disorder, one of the collagen diseases. The etiology of this condition is obscure, although recent studies have shown that hypersensitivity plays a large part. The microscopic pathology of polyarteritis is very similar to that of serum sickness, and it is felt by some that the two are identical or closely related, the latter being a mild form of the former. Both diseases have been seen following serotherapy in which serum in doses of 100 cc or more was used. A number of cases were reported with the advent of the sulfonamide era, and it has been fairly conclusively proven that foreign serum, sulfonamides, and other noxious agents have produced the disease.

All the collagen diseases have a similar basic morbid pattern. The beginning stage is increased production of connective tissue ground substance which is indicative of a disturbed activity of fibroblasts. In the severe or acute stages, fibrinoid degeneration and necrosis occur due to the precipitation of acid mucopolysaccharides with fibrinogen. In later stages there is a proliferation of fibroblasts with the appearance of large numbers of plasma cells, and in the chronic stages there is sclerosis with or without hyalinosis. Plasma cell proliferation and the concomitant elevation of gamma globulin appear to be factors in

the pathogenesis of this group of diseases. Experiments have shown that many of these diseases are characterized by a hypersensitivity diathesis; tremendous titers are obtained upon injection of foreign



*Figure 4. Photomicrograph of aneurysm in mesenteric artery. ( $\times 10$ )*



antigen, and it has been suggested that the collagen diseases may be spoken of as dysgamma-globulinemias.

The highest incidence of polyarteritis is between the ages of 20 to 40 years, and the ratio of affected males to females varies from 3 or 4 to 1. The disease mainly affects the small arteries and arterioles, but occasionally also affects the veins. It has been reported that the kidneys are involved in 87 per cent of the cases, the heart in 84 per cent, the liver in 71 per cent, the spleen in 31 per cent, and the lungs in 25 per cent. Histologically the lesions are divided into four stages:

1. *The degenerative stage*, in which there is fibrinoid degeneration of the intima and media. Complications of this stage are miliary aneurysms which may rupture and give rise to the hemorrhage frequently seen.

2. *The inflammatory stage*, in which the necrotic area and adventitia are densely infiltrated with polymorphonuclears, eosinophils, and sometimes lymphocytes and plasma cells. The infiltrate extends into the perivascular tissues, and the lumina of such vessels are not infrequently thrombosed.

3. *The granulation stage*, in which the necrotic portion of the vessels is replaced by granulation tissue. There is intimal proliferation with partial or total occlusion of the vessel.

4. *The fibrotic stage*, in which the destroyed vascular wall is replaced by scar tissue. The lumen may be reduced in size, obliterated, or recanalized.

Complications of the disease are aneurysmal dilatations of the vessels with rupture and hemorrhage, and thrombosis with infarcts. All stages may be found in one case of the disease, as exacerbations and remissions are frequently seen. The disease was at first thought to be uniformly fatal, but the recent literature indicates that many mild cases were heretofore probably unrecognized as such, and that histologically proven cases have apparently become cured.

#### Pathologic diagnoses:

Periarteritis nodosa, generalized, subacute stage, involving heart, pancreas, adrenals, kidneys, prostate, testes, esophagus, stomach, mesentery, petiphetal nerves, muscles, fascia, and brain.

Bronchopneumonia, right and left lungs, due to *Staphylococcus aureus*, *Streptococcus viridans*, and *Hemophilus parainfluenzae*

Doctor Scherr: One thing that somewhat puzzled me was that there was not too much stress placed upon the etiology of this particular condition. What would we call this if the patient had lived? This is

\*Capt. Merle A. Scherr, Chief, Allergy Section.

important because the allergy literature as well as the neurologic literature has contained a number of articles concerning this type of neurologic reaction in patients who had received penicillin as well as sulfonamides. In the older days, as was pointed out earlier, stress was placed upon horse "serum sickness" as a cause of this condition; however, I don't believe we see as much serum sickness now as we did in the past because of the use of toxoid, modern antibiotics, and chemotherapeutic drugs.

The emphasis placed upon the neurologic complications of drug reactions, particularly penicillin, has attracted much attention. These changes may involve the brain, the meninges, the nerve groups, or the nerves themselves, either singly or multiply (that is, the single neuritic lesion or the polyneuritic lesion). While any or all of these structures may be affected simultaneously, neuritis of the peripheral nerves and consequent paralysis is probably the most common syndrome. Males, particularly between 20 and 40 years, are most often affected. Penicillin given prophylactically is perhaps responsible, according to the literature, for more than half of the reported cases. The neurologic complications come on as a rule, after the onset of the other symptoms of so-called "serum sickness." I use the term serum sickness to denote symptoms rather than the cause being horse serum or one of the other related sera.

For some unexplained reason, the condition usually brings about the characteristic Erb-Duchenne scapulohumeral paralysis. In the neuritic type, the patient usually complains of severe pain involving the neck, shoulders, arms, and legs. This is followed within a few hours or longer by flaccid paralysis and subsequently by gradual atrophy of the muscles. Muscle tenderness, dull pains, and hyperesthesia persist for several weeks. Recovery, when it occurs, and usually it does occur, while sometimes slow, usually is complete within about six months. If these patients go on to death, one will usually find polyarteritis or periarteritis nodosa.

In the cases which have lived, unfortunately not too much study has been directed toward the true condition, and there are not too many pathologic specimens to prove or disprove the presence of polyarteritis. There are two very good articles<sup>8,9</sup> worth looking at in this respect. These authors particularly point out that one must be on the lookout for the various obscure manifestations of penicillin allergy. Most commonly, these will be (1) urticaria, (2) dermatitis medicamentosa, (3) erythema nodosum, (4) erythema multiforme, (5) contact dermatitis, (6) exfoliating dermatitis, (7) bullous dermatitis, (8) the so-called true serum sickness reaction with polyarthritis, fever, et cetera, (9) purpura, (10) agranulocytosis, (11) photosensitivity, (12) lupus erythematosus, (13) periarteritis nodosa, (14) anaphylaxis (which is the acute anaphylactic-type shock), and (15) miscellaneous conditions such as convulsions, peripheral neuritis, et cetera, such as I have mentioned. This should indicate the importance of drug reactions, particularly to

penicillin, which should certainly be kept in everyone's mind. Such a reaction was quite possibly the cause in this case.

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#### HAZARDS IN THE USE OF ANTIBIOTICS

Antibiotic therapy is no longer a simple matter. The doctor in his choice of an antibiotic now must accept a calculated risk in terms of the benefit which may accrue to the patient and toxic sequelae which may develop. The indiscriminate use of a relatively nontoxic drug, such as penicillin, is no longer to be condoned. In his selection of an antibiotic the physician must take into account the possibility that the condition may be caused by an organism not susceptible to the antibiotic. Further, there is the inherent risk of drug toxicity and the possibility that a sensitivity reaction may occur, or more pertinent, that the patient may be sensitized so that he will be denied the benefits of the antibiotic at a later date.

—F. B. RODMAN, Ph. D., M. D.  
in *Canadian Medical Association Journal*  
p. 638, June 1954

## SERVICE ARTICLES

# ARMY LABORATORY RESEARCH IN TUBERCULOSIS

ARTHUR F. LINCOLN, *Lieutenant Colonel, MC, USA*

SINCE World War II the introduction of such antituberculous drugs as streptomycin sulfate, para-aminosalicylic acid (PAS) and isoniazid (isonicotinic acid hydrazide) has greatly facilitated the treatment of patients with tuberculosis. With the transfer of many patients with early disease and nearly all with long-standing chronic disease to Veterans Administration hospitals, tuberculosis is not as great a military medical problem as it was in the past, although the incidence of new cases has not dropped appreciably. However, in many strategic areas, tuberculosis is still the major problem in infectious diseases. General mobilization or any increase in numbers of the military forces required in these areas with a high incidence rate would directly increase tuberculosis in the Armed Forces. The Army's peacetime mission is to prepare for war; thus, it is believed advisable to continue and stress research in the field of tuberculosis where many problems in the treatment and mechanisms of the disease remain unanswered.

### IMPORTANCE OF THE RESEARCH LABORATORY

As with any infectious disease, the success of a clinical research program in tuberculosis is almost totally dependent on the laboratory supporting it. Thus, the research laboratory becomes the keystone in the investigations of the therapy of the disease, the metabolism of the causative agent, and the host response to both. The current clinical emphasis is directed toward re-establishing host-parasite equilibrium by successful drug therapy. The research laboratory's responsibility in these studies is directed toward indicating the drug, or the combination of drugs, which will bring about the successful resolution of the disease. Facets of the supportive laboratory studies necessarily include an in vitro evaluation of each antituberculous drug being used, the evaluation of the drug dosage which will bring about a therapeutic response, and a study of any toxic reaction which may occur in the patient as a direct result of the use of the drug or drugs.

The research laboratory is responsible for recovering *Mycobacterium tuberculosis* from the patients under drug therapy, and in determining the behavior of the organisms in the presence of the antituberculous agent, or agents, which are being administered. If, after appropriate intervals of drug therapy, it is still possible to recover viable *Myco. tuberculosis* from the treated patient, then it must be assured that the specific chemotherapy employed is not adequate for that specific patient and that one of several things must have taken place: (1) It is possible that the organisms recovered are drug-resistant mutants which have developed in the presence of the antituberculous agents being used. (2) It may be that the dosage of the drugs used was inadequate to effect blood and tissue concentrations sufficient to eliminate the *Myco. tuberculosis* from the treated patient. (3) Although the serum drug level may have been adequate, little or no drug may have reached the disease-causing bacilli because of pathologic conditions at the site of the lesions. (4) It is possible that the drug dosage that was administered to the patient under study, though effective in most persons, may have been altered by metabolism to inactive derivatives.

Therefore, during the period in which the effects of specific drugs on the *Myco. tuberculosis* are being studied, serum concentrations of the antituberculous agents being administered to the patient are determined. At the same time that laboratory studies for the clinical evaluation of drug therapy are conducted, more fundamental investigations on the effects of specific antituberculous agents on *Myco. tuberculosis* are under way. Studies of this nature that have been conducted during the past several years, both in the research and development unit of this hospital and in other research laboratories, have brought to light significant facts related to the chemotherapy of tuberculosis.

### ISONIAZID

One of the significant discoveries, with respect to the antituberculous drug, isoniazid, is the unique way in which most mutants of *Myco. tuberculosis* which are selectively resistant to this drug are altered in their ability to cause progressive tuberculosis in normally susceptible laboratory animals, *i. e.*, the guinea pig, certain strains of mice,<sup>4</sup> and the Rhesus monkey.<sup>5</sup> Middlebrook<sup>6</sup> and Neumayr, Morse, and Morse<sup>4</sup> reported that concurrent with resistance to isoniazid and the loss of the ability to cause progressive disease in experimental animals, the metabolism of these microbes has been altered to the extent that certain processes normal to native isoniazid-susceptible *Myco. tuberculosis* are no longer fully active; *i. e.*, the activity of the endogenous enzyme catalase is either diminished or absent in isoniazid-resistant mutants of *Myco. tuberculosis*. The extent of alteration of the metabolism of these microbes seems to be direct-

ly related to the concentration to which these mutants are resistant to isoniazid.

One must not lose sight of the fact that the primary object of drug therapy is to aid in the elimination of the *Myco. tuberculosis* from the infected patient. Because the eradication of the bacilli from the patient may be impossible, then it may be desirable to render the remaining infecting organisms resistant to high concentrations of isoniazid, thus taking advantage of the fact that if isoniazid resistance is high, the surviving organisms may no longer cause a progression of the disease in these persons.

To accomplish either the eradication of most of the *Myco. tuberculosis* from the infected person, or to eliminate all but bacilli resistant to high levels of isoniazid, requires that adequate serum drug concentrations be established and maintained.

### ISONIAZID SERUM CONCENTRATION

Numerous investigative groups have reported the results of serum "isoniazid" concentrations determined by a chemical method.<sup>5</sup> The results obtained by this method indicate adequate serum isoniazid levels were being obtained, yet patients under study still excrete isoniazid-susceptible *Myco. tuberculosis* in their sputa, a fact which leads one to conclude that the organisms are not being reached by a biologically active drug. In support of this hypothesis, Hughes<sup>6</sup> has reported that from 40 to 60 per cent of the isoniazid administered to human beings is metabolized to an inactive acetyl derivative. (Other biologically inactive derivatives of isoniazid are formed but the principal one is reported to be the acetyl derivative.)

The research and development service of this hospital began a study of isoniazid serum levels by comparing the results obtained from applying two methods of analysis; the first, the commonly used Kelly and Poet chemical procedure,<sup>5</sup> and the second, a microbiologic assay procedure which measures only the isoniazid which is active against *Myco. tuberculosis*—free isoniazid. From the results of this work it was found that the values obtained by the chemical procedure differed markedly from the values obtained by the biologic assay method. Indeed, it was determined that patients receiving the usual drug dosage of from 3 to 5 mg of isoniazid per kilogram body weight per day obtained exceedingly small serum concentrations of this drug in its biologically active form. In studies in which volunteer patients received two to three times this concentration of isoniazid, it was found that in the serum of from 20 to 30 per cent of these persons there was little or no biologically active isoniazid present at any time after oral administration of the drug.<sup>7</sup> It was assumed that the discrepancy between the results determined chemically and biologically was due to the fact that the chemical pro-

cedure does not distinguish between free biologically active isoniazid and its acetyl derivative.

What to do about the situation? Obviously, more isoniazid must be given to patients to affect adequate biologically active drug serum levels. Can this be accomplished? In the past, the administration of more than from 300 to 400 mg of isoniazid daily in most patients was followed by the development of toxic neurologic reactions. However, it was shown by Biehl and Vilter<sup>9</sup> that increased concentrations of isoniazid could be safely obtained if, simultaneously, pyridoxine hydrochloride was administered. The simultaneous administration of pyridoxine hydrochloride with isoniazid prevented the development of the untoward toxic reactions to isoniazid. Concomitant with 100 mg of pyridoxine per day, it is now possible to administer isoniazid in concentrations up to 20 mg per kilogram body weight per day to most patients with tuberculosis without causing toxic side effects. However, a small number of patients receiving as much as 20 mg of isoniazid per kilogram per day still retain the ability to alter the biologic activity of this drug by means of metabolism. In answer to this problem studies were undertaken in the research and development laboratory at this hospital to find methods to decrease the metabolism of isoniazid, principally the acetylating mechanism.

#### METHODS TO DECREASE METABOLISM OF ISONIAZID

There were two approaches to this problem. The first was to provide an additional substrate which would compete for acetylation by being acetylated itself. The second was to block the acetylation mechanism with an appropriate agent.

Acetylation of isoniazid occurs on the amino nitrogen group of the hydrazine portion of the molecule. Other amino group-containing compounds are also subject to acetylation. With this fact in mind, studies were organized to test the acetylation competitive effect through the simultaneous administration of compounds which may be acetylated. The sulfa drugs and para-aminosalicylic acid (PAS) are compounds whose structure indicates that they should be subject to acetylation. Thus, if acetylation of isoniazid could be reduced by competition it would be possible to elevate the biologically active serum levels of isoniazid. It was found by Morse and co-workers<sup>7</sup> that the use of PAS, 12 grams per day with adequate doses of isoniazid, significantly elevated the free active isoniazid serum concentration. The Veterans Administration-Army-Navy cooperative study subsequently indicated the antituberculous chemotherapy regimen of isoniazid and PAS to be superior to all other drugs, or combination of drugs, now commonly used in the therapy of tuberculosis.<sup>10</sup>

The approach to blocking acetylation of isoniazid was by use of the compound, Pyrazinamide (brand of pyrazinoic acid amide). Pyrazinamide had been used in limited clinical trials in tuberculous patients for the past several years. It had been reported by several clinical groups that the combined use of isoniazid and Pyrazinamide in the treatment of tuberculosis was far superior to any other combination of antituberculous drugs. Yet, it was impossible to consistently measure in vitro the activity of this drug against the *Myco. tuberculosis*. It was found, too, that Pyrazinamide exhibited a toxic effect on the liver of some patients.<sup>11</sup> In evaluating the reports of the combined use of isoniazid and Pyrazinamide, it was theorized that the possible mechanism of action of Pyrazinamide was simply to inhibit the acetylation of isoniazid, the hepatotoxic effect of Pyrazinamide being responsible for an inhibition of the acetylating mechanism. With this hypothesis in mind, experiments were devised to evaluate the possibility. The results of the effects of Pyrazinamide on the acetylation of isoniazid reported by Perry and Morse<sup>12</sup> were rewarding, because of the discovery of a unique relationship which existed between *Myco. tuberculosis*, isoniazid, and Pyrazinamide. Certain isoniazid-resistant mutants of *Myco. tuberculosis* are susceptible to the in vitro antituberculous effect of Pyrazinamide. Mutants of *Myco. tuberculosis* resistant to approximately 4 and 15  $\mu\text{g}$  of isoniazid are susceptible to low concentrations of Pyrazinamide. *Myco. tuberculosis* susceptible to isoniazid, or resistant up to 4  $\mu\text{g}$  of isoniazid, are resistant to high concentrations of Pyrazinamide and, likewise, bacilli resistant to more than 15  $\mu\text{g}$  of isoniazid are also resistant to high concentrations of Pyrazinamide.

In certain patients, then, in whom it is impossible to significantly reduce the numbers of *Myco. tuberculosis* by combined drug therapy with isoniazid, streptomycin sulfate, and/or PAS (should the bacillary population be determined to be resistant to isoniazid between the critical concentrations of approximately 4 to 15  $\mu\text{g}/\text{ml}$  medium) isoniazid and Pyrazinamide may be successfully used.

The utilization of isoniazid-Pyrazinamide combined drug therapy must be scientifically approached. First, the *Myco. tuberculosis* being excreted by the patient in question must be analyzed as to their level of resistance to isoniazid, and, if it is found that they are initially resistant to a concentration of isoniazid which brings them within the critical limits of the in vitro susceptibility to Pyrazinamide, this drug may be added to the therapy regimen. If, however, it is determined that the mutants of *Myco. tuberculosis* from the specific patients are either susceptible, or resistant to only low levels of isoniazid, and therefore resistant to Pyrazinamide, then the patient must be given increased



dosages of isoniazid sufficient to effect an elimination of those bacilli which are not within the Pyrazinamide-susceptible range and leave only those that are within the susceptible range. If this can be accomplished it may well be possible that many of the so-called treatment failure cases may be adequately controlled by the appropriate use of these two antituberculous drugs. In addition to assaying the microbial population which still reside in these so-called treatment failure patients, it becomes equally important to determine the patient's metabolism of isoniazid, for, if these patients are highly active metabolizers of isoniazid, even though this drug is being administered in large doses, it may be impossible to select the remaining viable bacilli in the patient resistant to the concentrations of isoniazid which will render them susceptible to Pyrazinamide.

The importance of the chemotherapy of tuberculosis has made drug-susceptibility testing in the bacteriology laboratory as important as any other single factor in the management of tuberculosis in human beings.

#### ADEQUATE GROWTH MEDIUM ESSENTIAL

The first essential for isolation and drug-susceptibility testing is an adequate growth medium. Since the discovery of the causative agent of tuberculosis by Robert Koch in 1882, many isolation and drug-susceptibility media have been developed and improved upon. However, the growth rate of *Myco. tuberculosis* on these media is slow, a factor which has resulted in a considerable delay in providing laboratory confirmation of the clinical diagnosis, and in providing drug-susceptibility-resistance data.

Factors complicating the collection of precise data are: (1) Many strains of isoniazid-resistant *Myco. tuberculosis* either fail to grow, or grow very slowly, on conventional isolation and drug-containing media.<sup>13,14</sup> (2) Because of the huge inocula commonly used in the relatively crude techniques employed in inoculating drug-containing slants for susceptibility or resistance determinations, the data derived are of little qualitative or quantitative significance and fail to give a clinically reliable picture of the resistant and susceptible bacterial populations being excreted by the patient.

#### DETERMINATION OF SUSCEPTIBILITY

The techniques of determining drug susceptibility and resistance of *Myco. tuberculosis* are of two types, direct and indirect.

1. **The Direct Method.** In the direct method the decontaminated, concentrated clinical materials are directly seeded onto a medium containing no drugs and onto a medium containing selected concentrations of an antituberculous drug. The disadvantage of this method is that the size of the inoculum is not easily controlled.

However, this disadvantage may be partly overcome by the use of different dilutions of the decontaminated, concentrated material. On the other hand, the great advantage of the direct method is that the time required before a clinical laboratory report can be made is considerably shortened.

## 2. Indirect Methods. There are two indirect methods:

(a) The first type is that in which primary isolation is made on an artificial medium without drugs and a suspension of the acid-fast bacilli isolated is prepared from this culture. An appropriate dilution of the suspension is then inoculated onto plates or into tubes of medium containing selected concentrations of the drug to be tested.

(b) The second indirect type makes use of primary isolation, as in the first type, and then a subculture is made to a liquid medium containing Tween 80 (brand of polysorbate 80) for dispersed growth. Then with a "controlled" size of inoculum, tubes or plates of a solid medium with and without drugs are inoculated.

The latter indirect method has the advantage that highly precise, quantitative results may be obtained, *provided, of course, that drug-susceptible and drug-resistant strains multiply at the same rate on the primary isolation medium and in the subculture.* Unfortunately, this is seldom the case. Furthermore, the size of the inoculum plays an enormous role in determining the limits of usefulness of all tests of drug-susceptibility. For example, too large an inoculum will mask the presence of large numbers of drug-susceptible organisms. Indeed, after all the drug-susceptibility-resistant tests which have been performed and reported, and in consideration of all the attempts which have been made to correlate the results of in vitro drug-resistance tests with clinical response to chemotherapy, the existence of bacterial population differences very rarely has been kept in mind. In fact, as many as 99.9 per cent of the bacterial cells isolated may be susceptible to the drug in question, whereas a drug-resistant test performed using a large inoculum will give a distorted result indicating that all the bacterial cells in the population are resistant. The masking of culture population differences with respect to drug-resistant versus drug-susceptible organisms has been emphasized in published reports.<sup>14,15</sup> Thus, in the research and development service laboratories of this hospital, a new medium was adopted which would provide the most rapid growth from an inoculum containing small numbers of viable cells.<sup>13</sup> Also, a method was developed for performing direct drug-susceptibility tests, and this method was published as an intraservice report.<sup>16</sup>

## SUMMARY

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dosages of isoniazid sufficient to effect an elimination of those bacilli which are not within the Pyrazinamide-susceptible range and leave only those that are within the susceptible range. If this can be accomplished it may well be possible that many of the so-called treatment failure cases may be adequately controlled by the appropriate use of these two antituberculous drugs. In addition to assaying the microbial population which still reside in these so-called treatment failure patients, it becomes equally important to determine the patient's metabolism of isoniazid, for, if these patients are highly active metabolizers of isoniazid, even though this drug is being administered in large doses, it may be impossible to select the remaining viable bacilli in the patient resistant to the concentrations of isoniazid which will render them susceptible to Pyrazinamide.

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## SUMMARY

Certain facts have become evident from research conducted both in the research and development service laboratories at this

hospital and in other investigative laboratories. Among these are:

1. When therapy consisting of one drug or a combination of drugs fails, it is necessary to alter the therapy by use of anti-tuberculous drugs that have been found to be effective against the *Myco. tuberculosis* which still can be isolated from that patient.

2. It has become important to determine the serum levels of the specific antituberculous drugs being used in the chemotherapy of tuberculosis, particularly biologically active isoniazid. The standard 300-mg dose of isoniazid per day is probably not adequate therapy for many patients.

3. Each patient who does not respond to the specific anti-tuberculous drug as anticipated must be studied to quantitatively determine the percentage of *Myco. tuberculosis* which are susceptible or resistant to the drugs being used.

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### THE "CHIEF" COMPLEX

"Formerly, what I call 'the chief complex' predominated. Teaching hospitals tended to be divided into separate firms and departments, the headship of which was achieved automatically by the passage of years. (Surely it is a biological absurdity to assume that ability, any more than somatic growth, continues through life?) The system demanded that the chief should receive respect amounting almost to servility from his juniors. His word was law and it was unheard of for a junior to engage him in debate. This order of things harmed all but the best of the senior clinicians. They were deprived of the modulating, stimulating, and corrective influence of keen young minds. They came to rely too much on their own judgment and ability. For many the attainment of senior-staff status, with its attendant retinue of yes-men, initiated premature intellectual senility. At its worst this system sometimes resulted in a nonentity filling senior office for many years. Those of us who wish to preserve our faculties in some sort of useful working order surround ourselves with no-men, to ensure that our standards shall not sag with our waist-line."

—W. MELVILLE ARNOTT, M. D.  
in *Lancet*, p. 785, Oct. 15, 1955

# FACILITIES FOR MILITARY PATIENTS WITH BURNS OR ACUTE RENAL FAILURE

## *Air Evacuation and Specialized Treatment*

ROBERT D. PILLSBURY, *Lieutenant Colonel, MC, USA*

PAUL E. TESCHER, *Major, MC, USA*

CURTIS P. ARTZ, *Lieutenant Colonel, MC, USA*

THE SPECIALIZED services available at the Surgical Research Unit of this medical center are called to the attention of all medical officers by Circular Number 16 from the Office of the Surgeon General, U. S. Army, dated 3 March 1955. These services are specifically available to the armed services for the treatment of patients either with *extensive burns* or with *acute renal failure*. Any hospital commander in the zone of the interior may call the Burn Ward at Brooke Army Hospital, for assistance when he has a patient in either of these two categories. Because of the excellent co-operation of the Patient Movement Control Section of Military Air Transport Service, either a burn team or a renal team may be expeditiously transported to the patient's bedside to provide assistance in the treatment of the patient and to supervise his evacuation to this hospital.

### PATIENTS WITH EXTENSIVE BURNS

Since January 1952, more than 80 patients with burns have been successfully evacuated from hospitals in the continental United States to the Burn Center of the Surgical Research Unit. Results obtained in these patients illustrates the contribution of the Surgical Research Unit to the management of patients in this category.

In most cases as soon as the burned patient arrives in a hospital ward, the ward officer in charge and/or the hospital commander contacts the Burn Center via telephone for specific advice on all aspects of early management of the severely burned patient until a burn team can arrive at the patient's bedside. Immediately after the initial telephone call, the Military Air Transport Service is contacted, and usually within two hours a burn team can be en route to the Air Force base nearest the

hospital in which the patient is located. Representatives of the hospital frequently meet the burn team at the airport to provide efficient transportation of the team and its equipment to the patient's bedside. Further help in the management is provided: the burn team aids in calculating the exact volumes of colloid and electrolyte solutions required by the patient, suggests additional immediate local care of the burned surface, and performs a tracheotomy if indicated.

It was found that air evacuation of patients is better tolerated within the first 48 hours following the burn than at any time in the next two weeks. The C-131 (convair) aircraft with pressurized cabin used in these evacuation trips provides excellent room and suitable equipment for care of the burn patients while in flight. Oxygen is available when indicated, as well as suction apparatus for proper cleaning and toilet of the upper tracheobronchial tree.

On arrival at Brooks Air Force Base, San Antonio, Tex., the patient is transferred at once either by ambulance or helicopter to Brooke Army Hospital.

With standing authorization for telephone communication and for dispatch of a burn team, physicians throughout the entire United States have obtained excellent advice on the management of burns immediately, have begun definitive therapy within a few hours following the injury, and such therapy safely continued without interruption through air evacuation over long distances. Again experience has proved transfer of severely burned patients within the first 48 hours following a burn can be done with a greater degree of safety than if the patient is held for several days prior to transfer.

#### ACUTE RENAL FAILURE

The same authorization for telephone communication, dispatch of a renal team to the patient's bedside, supervision of the patient during air evacuation, and admission to the Surgical Research Unit Ward, Brooke Army Hospital, was extended in 1954 for patients with acute renal failure (acute uremia, "lower nephron nephrosis"). This authorization was in recognition of the fact that although such acute renal failure is potentially reversible, complications during management result in a high mortality rate.

The facilities available to the Surgical Research Unit in the management of such patients include a trained staff (the renal team), an excellent supporting laboratory, and an artificial kidney.

Contact with the Surgical Research Unit for information is invited, and transfer of patients to this facility is authorized if the following criteria are met:



1. It is reasonably certain that the patient's urinary output has been less than 500 ml per 24 hours for at least three days, with a urinary specific gravity less than 1.030; that is, persistent oliguria in the absence of dehydration is documented. If acute renal failure follows trauma, metabolic abnormalities may progress at such a rate as to endanger the patient if transfer is delayed beyond three days following the onset of oliguria. Transportation of patients with acute renal failure following the third day becomes increasingly hazardous.

2. The patient is not hypotensive, that is, has been fully resuscitated from any previous episode of shock.

3. The continuity of the genito-urinary tract has not been interrupted.

4. Irreversible chronic renal disease as the cause of oliguria has been excluded with reasonable certainty.

In the first six months after the institution of this evacuation service, five such patients were admitted to the Surgical Research Unit Ward following successful air evacuation. Treatment of the patient was carried forward by use of the artificial kidney when potassium intoxication or clinical uremia progressed despite medical management.

#### SUMMARY

Because of the extensive requirements of both clinical personnel and laboratory support, optimal management of patients with burns or with acute renal failure, particularly of traumatic origin, cannot be provided in all medical installations throughout the armed services.

Announcement is made of the availability of such facilities to all patients of the armed services in the continental United States at the Surgical Research Unit, of this center. A burn team or a renal team may be dispatched to the patient's bedside to assist in management at the point of origin and during evacuation of such patients by way of Military Air Transport Service to Brooke Army Hospital. Communication for such information and arrangements has been authorized.

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*Wait for the public to make you a specialist—don't anoint yourself.*—Martin T. Fischer

# USE OF THE SHELLEN TRACHEOTOME IN MILITARY MEDICINE

BENJAMIN L. CRUE, Jr., *Lieutenant Commander, MC, USN*

**E**MERGENCY tracheotomy can be a lifesaving procedure. Conversely, the lack of an adequate airway can rapidly prove fatal. This is true both in larger medical facilities where available means for tracheotomy are not always utilized in time and also at smaller aid stations where the necessary equipment may not be available. The standard operative method for tracheotomy as an emergency procedure requires considerable time and may add further trauma to a patient already in a critical condition.

To obviate these deficiencies the Shelden tracheotome was developed.<sup>1</sup> This consists of a short-slotted No. 13 needle, a tapered tracheotomy tube, and a cutting trocar (figs. 1 and 2). Briefly, it is used in the following manner: The operator stands at the head of the patient. The neck is extended. The slotted needle is easily inserted through the skin and angled downward into the trachea about one inch below the larynx. The needle can unmistakably be felt entering the lumen, and the breath sounds soon verify its position. The needle is then rotated so that the slot is lateralward. Next, the ball tip on the cutting trocar (already in place inside the tracheotomy tube) is inserted into the slot and the entire instrument is pushed forcibly downward. When the ball has passed beyond the end of the needle, the needle is withdrawn. The tracheotomy tube is then pushed on into place. Removal of the trocar then leaves the tracheotomy tube in its usual position. The entire procedure requires no other instruments and takes from 15 to 30 seconds.

The author has performed this type tracheotomy on 10 patients. The only complication encountered was in one case where, through undue haste, the operator stood beside the patient's bed and attempted to work backwards. The patient had ceased breathing and, in attempting to insert the cutting trocar, the slotted needle slipped out of the trachea. A second uneventful puncture of the trachea was carried out.

While the original purpose of the Shelden tracheotome was its use in emergency situations, the procedure has proved so simple

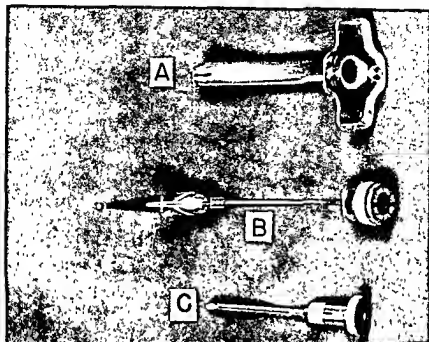


Figure 1. Anterior view of instrument showing (A) tapered tracheotomy tube, (B) cutting trocar, and (C) slotted needle.

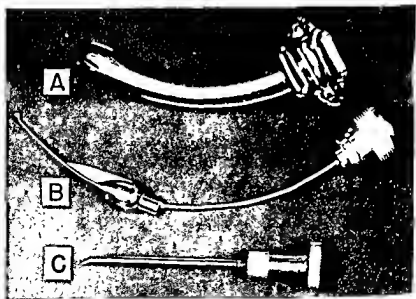


Figure 2. Lateral view.

hospitalization, her condition improved and she was discharged from the hospital.

On 17 November 1955, the patient complained of pain in the left lower quadrant. On physical examination there seemed to be a mild tenderness to pressure in the bladder area and over the left adnexa. A roentgenogram revealed a calcified body in the lower left pelvic region, suggestive of a ureteral calculus. Her urine showed clumps of white blood cells and bacteria. Culture of the urine revealed *Proteus* and *Aerobacter aerogenes*. The organisms showed a resistance to all tested antibiotics except Furadantin and bacitracin.

The patient was given 100 mg of Furadantin every 6 hours. With the first few doses of Furadantin she was given Benadryl (brand of diphenhydramine hydrochloride) for her incidental rhinitis. After a total dosage of 33 tablets of Furadantin, the patient developed a papulomacular rash that involved her trunk and extremities, being most marked on volar sides of her arms (figs. 1 and 2). The head, face, neck, and mucous

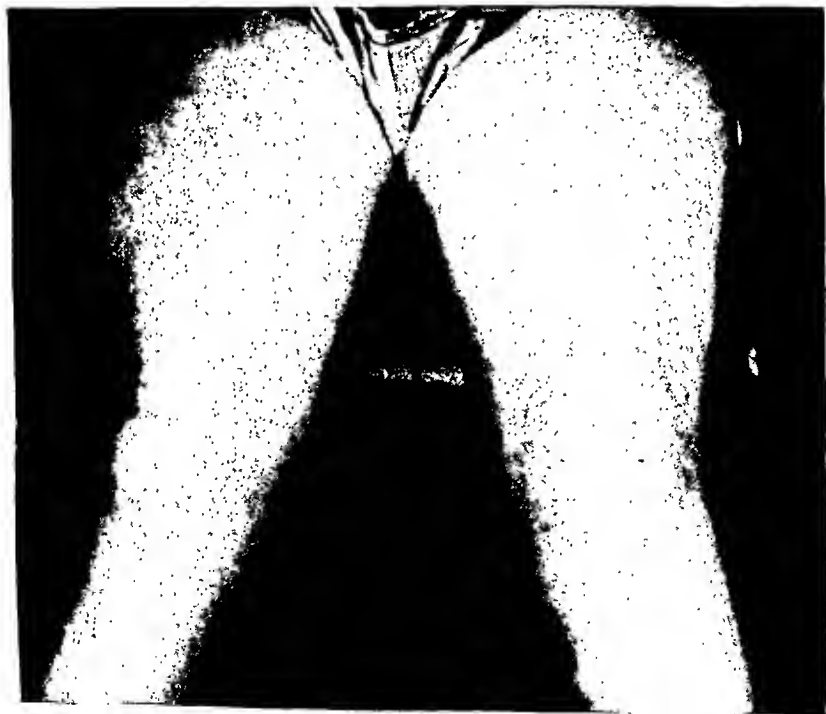


Figure 1. Papulomacular rash on extremities.

membranes were not affected. Her temperature was normal and there were no signs of upper respiratory tract infection. She was put on Benadryl after Furadantin was discontinued. The following night her temperature rose to 104.5°F and the rash became more accentuated, especially on the lower limbs, but there were no other signs of illness,

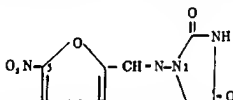
# CASE REPORTS

## Sensitivity to Furadantin

JOSEPH REBHUN, *Captain, MC, USA*

**F**URADANTIN (brand of nitrofurantoin) is a relatively new drug that was produced through systematic investigation of compounds containing the furan nucleus. Its predecessor is the familiar Furacin (brand of nitrofurazone), which is one of the products obtained by adding a nitro group at position 5 in the furan nucleus. Furacin was found by Dodd and Stillman<sup>1</sup> to have a considerable antibacterial activity. It is used as a dressing for wounds, in the treatment of patients with ulcers, and as an antiseptic. Some cases of sensitivity to furacin have been noted.

Furadantin [N-(5-nitro-2-furfurylidene)-1-aminohydantoin] has the following structural formula:



It is a wide-spectrum antibiotic, both bacteriostatic and bactericidal, and is effective against gram-positive and gram-negative micro-organisms. Because of its effectiveness in the treatment of bacterial invaders of the urinary tract, it is now being used more extensively for this purpose, and awareness of possible sensitivity reactions is important. It therefore seems appropriate to direct attention to such sensitivity in the following case report.

### CASE REPORT

A 50-year-old patient had polyuria for several years. On 16 May 1954, she was injured in a car accident, sustaining fractures of several ribs on the right and left, both pubic rami, and the left tibia. The patient had grossly bloody urine, and a retention catheter was inserted. She developed urinary tract infection, which apparently was controlled by chlortetracycline hydrochloride (aureomycin). After several weeks of

From Letterman Army Hospital, San Francisco, Calif.

medication. This is sufficient time for the production of an anamnestic reaction during the course of treatment.

Other criteria to classify this case as a sensitivity reaction are: The patient was known to have other allergies, in particular another drug allergy. She received a therapeutic dose that does not cause similar symptoms in a majority of patients. There was no cumulative effect, inasmuch as this drug is eliminated very quickly. The allergic symptoms would not seem to be related to the pharmacologic action or usual toxic effects of the drug, or to the tissue which is the therapeutic target. These criteria, which would apply to any drug sensitivity, are stressed to emphasize the necessity of differentiating allergic reactions from toxic ones. The latter are usually a function of the dose; the former may become dramatic if not recognized early.

Classification of the side effects of Furadantin as either toxic or allergic is useful, although a sharp distinction cannot always be drawn between the two groups of symptoms. Some cutaneous skin reactions due to drugs might not be allergic.<sup>2</sup> Thus, to list certain of the manifestations in the group "allergic reactions" would merely indicate that they usually appear in drug allergies, but may be of a nature other than allergic.

The *toxicity* of Furadantin as reported by numerous authors<sup>2-8</sup> affects mainly the gastro-intestinal tract, causing gastric irritation, nausea, vomiting, and diarrhea, with nausea the most prominent symptom, by far. Hasen and Moore<sup>6</sup> also reported a few instances of dizziness, headache, and numbness of the extremities, plus a single case of blood dyscrasia out of a total of 100 patients. Richards and his associates<sup>8</sup> mention one case of vertigo and nystagmus.

Relatively few *allergic reactions* have been reported, although out of 42 patients, Draper and his associates<sup>4</sup> stated that they found 17 cases of eosinophilia and 3 of mild generalized erythematous and exfoliative skin rash. Other investigators,<sup>2,3,6,7,9</sup> out of a total of 346 patients studied, found 3 cases of urticaria, 2 of diffuse maculopapular eruption, 2 of angioneurotic edema, and 1 of general pruritus. Finally, 2 cases of pulmonary infiltration have been observed radiographically.<sup>10</sup>

These untoward reactions seem to appear in a range close to the one seen in treatment with tetracyclines. They can be alleviated by decreasing the dose, giving the drug with food and alkalis, and coating the tablets. Preliminary investigations of possible renal or hepatic toxicity and testicular suppression suggest that the drug does not affect the kidneys, liver, or testes. No definite neurotoxicity has been described, nor have superimposed infections, in particular with bacterial strains resistant to usual anti-

and no discomfort. The next day, although her temperature dropped 2.5°F, she was apprehensive and mildly dyspneic, and had a feeling of "squeezing" in her chest. She was hospitalized for 24 hours. No treatment other than Benadryl was given.



*Figure 2 Papulomacular rash on trunk and arms.*

The laboratory findings were as follows: white blood cell count, 6,050 per  $\mu$ l, with a differential count of 60 per cent neutrophils, 35 per cent lymphocytes, 1 per cent monocytes, 4 per cent eosinophils; hemoglobin, 13.3 g/100 ml; bleeding time, 2¼ min; coagulation time, 5¼ min; platelets normal; sedimentation rate, 37 mm/hr, hematocrit, 42/100 ml; urine, normal, except for 8 to 10 white blood cells. A roentgenogram of the chest was normal.

After discontinuation of the drug all the symptoms ceased, except for the rash, which disappeared two weeks later. Her urine still showed white blood cells, although it was sterile.

#### COMMENT AND DISCUSSION

The patient's medical history was irrelevant, except for allergy. Her allergic rhinitis was of many years' duration, and she had had a systemic reaction to sulfonamides in 1954. She had never before been exposed to Furadantin or to a related compound, but there was an incubation period of 8 days after the start of Furadantin

# The Use of Epiphyseal Stapling in Unusual Situations

AUGUST W. SPITTLER, *Colonel, MC, USA*

ROBERT J. BARNETT, *Lieutenant Colonel, MC, USA*

**E**PIPHYSEAL plate stapling as a method of retarding unequal bone growth in the lower extremities and for straightening deformed extremities has become commonplace. Two unusual cases in our series of patients at this hospital are presented to illustrate further use of this method. One patient was an achondroplastic dwarf with severe angulatory deformity of both knees, and the other patient had genu valgum following a closed fracture.

The role of the epiphyseal plate in longitudinal growth was studied as far back as 1794 when John Hunter bored two holes in the diaphysis of the tibia of a young pig and filled them with lead. After the growth of the pig, the space between the lead markers measured exactly the same as when bored. Macewen,<sup>1</sup> in the early 1900's removed a large segment from the shaft of the radius of a dog, placed metal caps as markers over the sectional ends of the bone, and showed thereby that growth was entirely in the epiphysis as the metal caps approached each other. Ollier,<sup>2</sup> in 1888, was probably the first to deliberately arrest growth to correct deformity by resecting both epiphyseal cartilages of the fibula in correction of a varus deformity of the ankle.

The modern method of temporary epiphyseal arrest was instituted by Haas<sup>3-5</sup> when he discovered that the epiphyseal plate could be arrested with a wire loop and that growth was resumed when the wire broke or was removed.

In 1949 and 1952 Blount and Clark<sup>6</sup> and Blount and Zeier<sup>7</sup> reported on the use of stainless steel staples to produce temporary epiphyseal arrest. Spittler and Brannon<sup>8</sup> in an attempt to shorten the operating time and avoid possible damage to the epiphyseal plates by a misplaced staple, advocated the use of a thin Kirschner wire as a guide. In the cases reported herein, the staples were inserted with the Kirschner wire as a guide.

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From Walter Reed Army Hospital, Washington, D. C. Col. Spittler is now assigned to Tokyo Army Hospital, APO 500, San Francisco, Calif.



biotics, been stressed. No anaphylactic reaction has yet been reported.

The case described in this report is the first clear-cut sensitivity reaction noted in this hospital since Furadantin was introduced here three years ago. Data furnished by the chief of the genito-urinary service indicates that of about 750 inpatients per annum, 100 receive Furadantin; of 2,500 outpatients, 300 are so treated. The usual course of treatment is 5 or 6 days, but there are cases where the drug has been continued as long as 90 days. Side effects, related primarily to the gastro-intestinal tract, necessitate discontinuance of Furadantin in about 2 or 3 patients per month.

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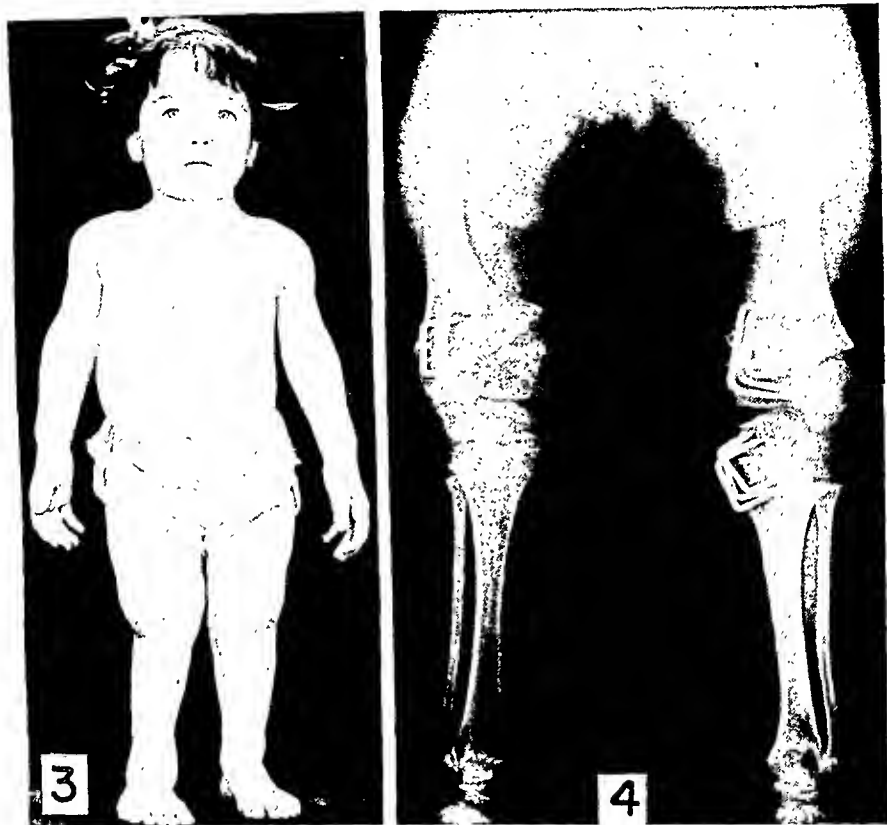
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#### THE GOOD SPEAKER

"Medical educators state that one of the greatest needs in medicine today is for qualified and inspiring teachers. Good pedagogy is closely bound to good and effective methods of presentation of material which is another way of saying that a good teacher is a good public speaker. A little thought on the subject will show that in the Army many choice assignments, professional and staff, depend upon teaching and speaking ability. For this reason, it is desirable to improve our technique of presentation of ideas."

—WARNER F. BOWERS, Col., MC, USA  
in *Military Medicine*  
p. 455, Nov. 1955

**Case 2.** This six-year-old boy had moderately severe genu valgum of the right knee, the result of a fracture in the proximal third of the tibia in the previous year (figs. 5 and 6). Because of the pronating effect this was having on his foot, stapling was advised to correct the deformity. On 17 May 1950 the medial tibial epiphysis at the knee was



*Figure 3 (case 1). Postoperative correction of left knee with slight overcorrection of right knee. Figure 4 (case 1). Roentgenogram showing position of staples and correction of deformity.*

stapled (fig. 7) and by December 1951 a slight overcorrection had been accomplished and the staples were removed (fig. 8). It is interesting to note that with the correction of the valgus deformity of the right knee, the right foot pronation eventually became less than that of the opposite foot.

#### SUMMARY

Epiphyseal stapling was used in the correction of deformities of the knees in two unusual cases. One patient was an achondro-

## CASE REPORTS

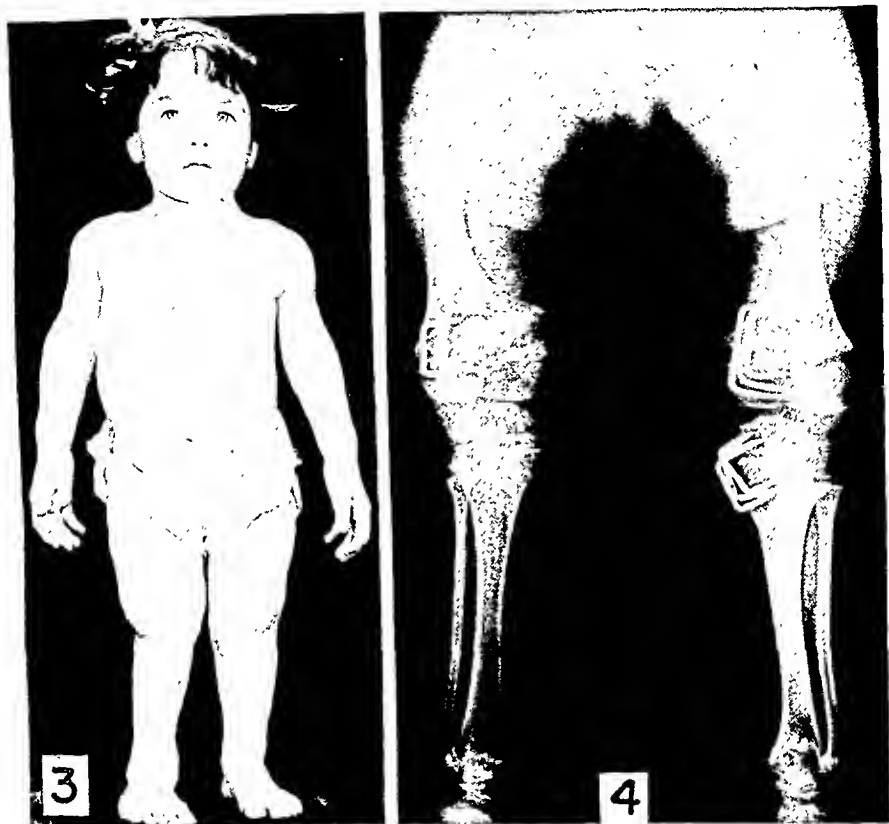
Case 1. A six and one-half-year-old girl with achondroplasia and severe angulatory deformities of the knees had been treated with braces in the orthopedic clinic for some time with little improvement. On admission to this hospital, examination of her lower extremities revealed a 35-degree genu valgum of the left knee and a 17-degree genu varum of the right knee (figs. 1 and 2). On 15 March 1951 the medial femoral



Figure 1 (case 1). Severe angulation deformity of both knees. Figure 2 (case 1). Roentgenogram showing knee deformities before corrective operation.

and medial tibial epiphyses at the left knee and the lateral femoral epiphysis at the right knee were stapled. Because there were no staples with wide enough spread or deep enough prongs available, handmade ones were fashioned in the operating room from stainless steel Kirschner wires. By 24 March 1953 the right knee had slightly overcorrected and the left knee was straight (figs. 3 and 4). The staples were removed from the right knee in April, but were allowed to remain in the left knee until September 1953. Two years were required for the correction, but this was not an unusual length of time because of the nature of the condition. It is now believed that the overcorrection in the right knee was unnecessary as it has been slow in returning to normal and is still slightly valgus in alignment. When the patient was observed almost a year after the removal of the staples, the left knee had continued to remain straight.

**Case 2.** This six-year-old boy had moderately severe genu valgum of the right knee, the result of a fracture in the proximal third of the tibia in the previous year (figs. 5 and 6). Because of the pronating effect this was having on his foot, stapling was advised to correct the deformity. On 17 May 1950 the medial tibial epiphysis at the knee was

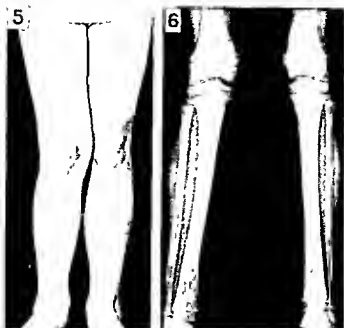


*Figure 3 (case 1). Postoperative correction of left knee with slight over-correction of right knee. Figure 4 (case 1). Roentgenogram showing position of staples and correction of deformity.*

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#### SUMMARY

Epiphyseal stapling was used in the correction of deformities of the knees in two unusual cases. One patient was an achondro-



*Figure 5 (case 2). Moderate genu valgum, right knee, secondary to fracture with pronation of foot. Figure 6 (case 2). Roentgenogram showing genu valgum secondary to fracture of tibia.*



*Figure 7 (case 2). Roentgenogram showing position of staples. Figure 8 (case 2). Deformity of right knee and foot corrected.*

plastic dwarf with severe angulation deformities of both knees. The other patient, a six-year-old child, had genu valgum as the result of a fracture. Excellent clinical results were obtained.

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#### THE GROWTH OF THE DOCTOR

"The good physician must be educated to grow in step with the growth of medicine. It is important to distinguish what is implied by that much-abused word "training" from "education." Training implies drill. The aim is to achieve the skill and precision of the drill-master. Education, on the contrary, implies growth, growth unlimited, autonomous, and in perpetuity, but by no means undisciplined.

"A medical education must furnish not only the basic core of knowledge without which the title "doctor" cannot be honourably borne, but an abundant, vivid, and practical experience in the use of scientific method. Of the two, the latter has the greater value, since it is the enduring instrument whereby new knowledge can be won and all knowledge can be tested. It is the means of continued healthy growth that assures that the ageing physician's practice will not remain for ever that of his first indoctrination."

—AVERILL A. LIEBOW, M. D.  
in *British Medical Journal*  
p. 306, Feb. 11, 1956

# The Bender-Gestalt Test

## In a Patient Passing Through a Brief Manic-Depressive Cycle

EDWARD J. MURRAY, *First Lieutenant, MSC, USA*

FRANCIS J. ROBERTS, *PFC, Clinical Psychology Technician, USA*

**T**HE PURPOSE of this report is to present the results of the Bender-Gestalt test<sup>1</sup> administered to a patient who was initially depressed, then became manic, and finally reached an equilibrium.

### CASE REPORT

The patient, a 26-year-old Negro, came to the clinic because of nightmares, restless sleep, and fleeting thoughts of killing. During the social worker's interview, he appeared constricted and depressed. The Minnesota Multiphasic Personality Inventory showed an elevation of the depression and obsessive worrying scales. At this point the Bender-Gestalt test, using the copy technic alone, was given to the patient with the result shown in figure 1. The figures were drawn in an extremely constricted area.

The patient was treated as an outpatient and was seen 12 days later by a psychiatrist. At this time the patient appeared to be manic with excessive motor activity, rapid and circumstantial speech, and more impulsive thoughts of killing. The Bender-Gestalt test was administered again with the result shown in figure 2. The figures were drawn more expansively and several figures were rotated, distorted, and poorly placed. This pattern is usually viewed as indicating a psychotic involvement.

The patient was hospitalized for 11 days and showed a good superficial improvement as a result of reassurance and milieu therapy. On the day of discharge from the hospital the Bender-Gestalt test was administered again. The result, shown in figure 3, is normal. The figures are relatively free of distortion and show neither constriction nor expansiveness.

As a follow-up the Bender-Gestalt test was administered twice after discharge: 23 days after discharge and again 13 days later. The results were comparable with those in figure 3. Naturally, by this time one would expect some learning effect, but the patient did appear to maintain his improved adjustment, as determined by interview.

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From U. S. Army Hospital, Fort Belvoir, Va.





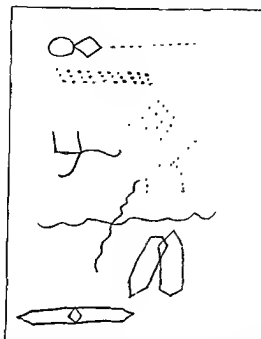


Figure 3. Results of the Bender-Gestalt test after patient's hospitalization during which time he showed some improvement.

The results obtained from this study lend some support to the validity of the Bender-Gestalt test as a measure of personality constriction and expansiveness. More cases are needed before any conclusions are drawn, but it should be noted that these phenomena are difficult to study experimentally and must be caught on the wing in the clinic setting. It is hoped that this result will stimulate further research.

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*Of course, I teach you only the truth—but that shouldn't make you believe it.*—Martin T. Fischer

# Scleroderma

## Affecting the Masticatory Apparatus

JAMES E. CHIPPS, *Lieutenant Colonel, DC, USA*  
VICTOR R. HIRSCHMANN, *Colonel, MC, USA*

**S**CLERODERMA may involve muscle tissue, limiting the functional development of the part which, not uncommonly, may be the face and neck. The disease is of interest to dentists because of occasional reports of probable gingival and periodontal involvement. However, the disease usually begins in adult life after development of the masticatory apparatus. Therefore, the following instance of the disease beginning in childhood and markedly affecting the development of the oral structures is of interest.

### CASE REPORT

A seven-year-old girl came to the dermatology clinic because of a chronic atrophic disease of the lower right face.

**Past History.** No abnormality had been noted prior to the age of 15 months. At that time, the patient fell from a chair, striking the right side of the face. Two weeks later, a bluish discoloration appeared over the right ramus of the mandible and the submandibular region. In the next three years, the area of disease slowly extended to involve most of the lower right face. A brownish pigmentation appeared which slowly worsened until age four and one half, then slowly improved. Early in the disease, a specialist made a diagnosis of scleroderma and attempted various treatments for about a year without noticeable effect. Since the age of four and one half, the area of involvement had not noticeably increased, but submental and submaxillary node enlargement was noted at age six and one half and a specialist was again consulted. He found brownish pigmentation of the skin of the right preauricular, parotid, mandibular, and cervical regions. The skin appeared translucent and atrophic. Skin veins were prominent. Induration of the right floor of the mouth was noted and missing teeth were reported but no comment was made at that time as to tongue involvement. A roentgenographic survey reported retarded development of the right ramus of the mandible. A skin biopsy was reported as histologically compatible with a diagnosis of scleroderma.

Throughout the period rampant caries was noted and several deciduous teeth had been extracted.

No recent changes had been observed and the parent had brought the girl to the clinic on advice of the family physician. The dermatologist referred the patient for dental consultation and the girl was observed in the two clinics for a year.

**Physical Examination.** Examination of the patient on admission to the dermatology clinic of this hospital revealed atrophy and gray-brown pigmentation of the skin extending from behind her right ear over the right cheek to the midline of the lips and downward over the mandible to include the upper right neck. The involved skin was translucent, veins were prominent, and subcutaneous fat was deficient, but the skin was generally pliable. The entire lower half of the right side of her face was less developed than the left. Her right ear was approximately one third smaller than the left and turned slightly outward. Both lips were thin and compressed against the dental arches on the right. The right half of the mandible was palpably smaller than the left. This general appearance had not altered when the patient was photographed a year later (figs. 1 and 2), although skin pigmentation had improved.



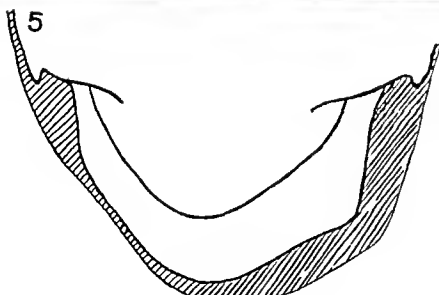
*Figure 1. Profile view of patient showing atrophy of the lower right part of the face.*

*Figure 2. Full-face view of patient shown in figure 1.*

*Figure 3. Atrophy of the right half of the tongue.*

*Figure 4. Posteroanterior roentgenogram showing asymmetry of mandible.*

*Figure 5. Overlay tracing of posteroanterior roentgenogram accenting mandibular and soft tissue asymmetry.*



Intra-orally, the floor of the right side of the patient's mouth was thin and indurated. The right submaxillary duct was atrophied and there was no evidence of sublingual or submaxillary gland function. However, the right parotid duct was patent and discharging saliva. The right half of the tongue was atrophied (fig. 3) and the tongue deviated to the right on extrusion. The mucosa throughout the right side was thickened. Six deciduous molars had been previously extracted. There was a marked distoclusion as well as individual malposition of teeth. Caries was marked. The eruption of teeth appeared chronologically normal.



*Figure 6. Lateral roentgenogram of unaffected left body of mandible.*

The posteroanterior roentgenogram showed a marked mandibular asymmetry (fig. 4). An overlay tracing of this x-ray (fig. 5) accents the even more marked asymmetry of the soft tissue overlying the mandible. The lateral roentgenograms (figs. 6 and 7) showed that the dental follicles in the affected right side occupied essentially the entire vertical dimensions of the medullary bone. However, the stage of follicular development appeared symmetrical in both right and left sides. In the films, the measurements of the posterior border of the mandible from crest of condyle to angle were 3.9 cm on the right and 5.5 cm on the left. The vertical mandibular thickness in the bicuspid areas was 1.5 cm on the right and 2.3 cm on the left. Horizontal asymmetry was less marked, the inferior border of the mandibular body from first molar to canine area measuring 4.7 cm on the right and 5,

**Course.** In the year that the patient was followed, the disease appeared inactive. Growth of the mandible was noted on both sides. Pigmentation of the skin appeared to clear considerably. The indurated mucosa remained unchanged, as did the tongue. No submaxillary or sublingual salivary gland activity was noted.

The patient received dental restorations for caries. Appliances to maintain the spaces created by the loss of deciduous teeth were constructed. During the year, eruption of the permanent bicuspid began bilaterally.



*Figure 7. Lateral roentgenogram of right body of mandible showing marked atrophy of bone but similar chronologic development of teeth as on the left.*

Contact with the patient was then lost because of a military transfer of the parent.

#### COMMENT

The most interesting finding in this case is that follicular development and eruption of teeth appeared to be bilaterally symmetrical in spite of the marked unilateral atrophy. The malocclusion and, possibly, the rampant caries were but secondary results of the anatomic asymmetry and malfunction.

The parent definitely related the onset of the disease to the date of trauma. However, the etiology of scleroderma remains unknown.

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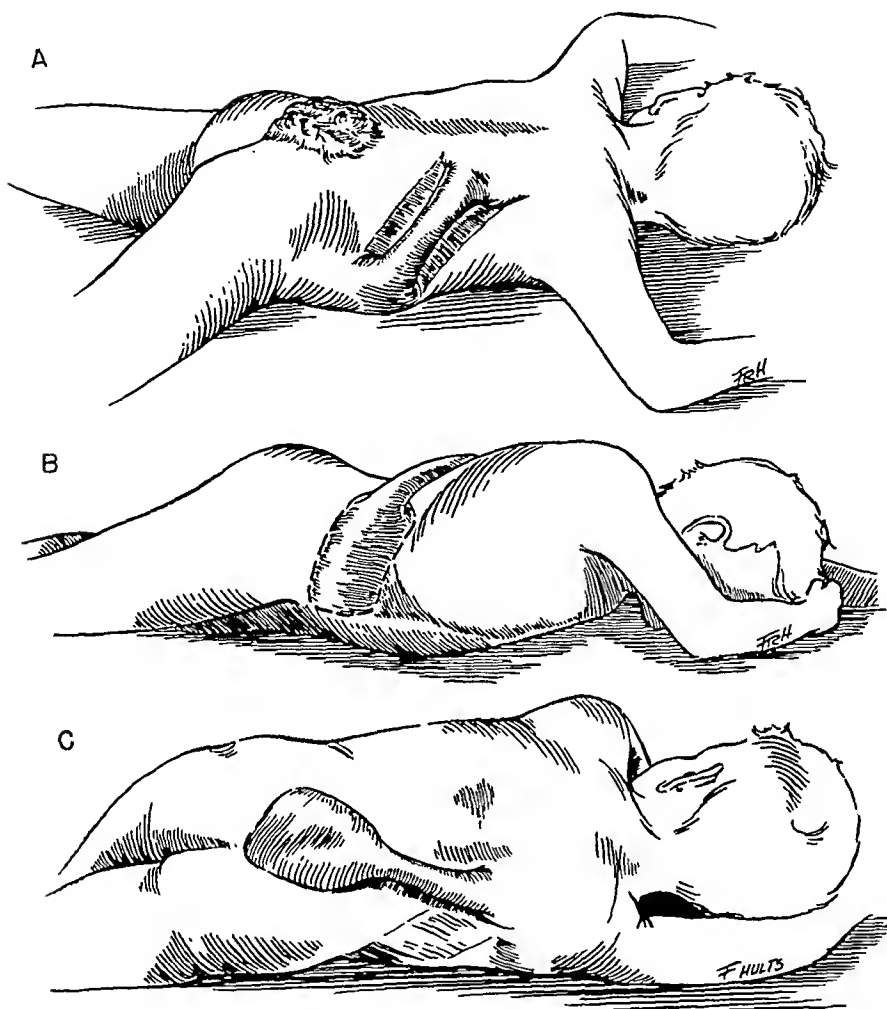


Figure 1 (A) The first-stage construction of the combined tube and open flap. (B) Position of the attached flap. The dotted lines represent summation of delay incisions. (C) Open flap rotated to recipient site.

#### DISCUSSION

The combined tube and open flap as a unit transplant was shown by one of us<sup>1</sup> to be a satisfactory procedure in large shoulder defects of World War II casualties not remedial by other methods of coverage. Prior to this, the principle was used by others.

The technic of plastic surgery described here is a rather large undertaking for employment in a young child. In the past, the methods of repair have consisted of fascial alterations or local revisions of soft tissues to obtain skin and subcutaneous tissues as a flap.



# Repair of Meningomyelocele by Plastic Surgery

BERNARD N. SODERBERG, *Colonel, MC, USA*

JOHN B. SUTTON, *Captain, MC, USA*

**A**N UNUSUAL procedure of plastic surgery was employed for the repair of a large meningomyelocele in a two and one-half-year-old boy.

## CASE REPORT

The patient presented a congenital meningomyelocele of the lumbar region, measuring 8 by 8 cm. The covering layer, composed of epithelium and dura, was so thin and unstable that the life of the child was in constant jeopardy, because rupture followed by meningitis is not an uncommon occurrence under such circumstances. To eliminate this hazard, better defect coverage was imperative. The associated congenital defects were bilateral dislocations of the hips, partial paraplegia, bilateral talipes equinovarus, and apparently arrested hydrocephalus. All mental reactions seemed normal for a child of this age, and laboratory studies were within normal limits.

A combined tube and open flap was constructed to supply skin and subcutaneous soft tissue coverage for the meningomyelocele. Since insufficient lateral tissue was present, the soft tissue transfer was accomplished by transporting an abdominal flap to the recipient site. The posterior thoracic tube was constructed utilizing a partial thickness free skin graft to cover the denuded donor site (fig. 1A). Three weeks after this was healed, the operative procedure for the connecting open flap was begun. This attachment was located on the lateral abdomen (fig. 1B). The operation was performed in three stages, each two weeks apart.

At the fifth operation, the entire structure was transported to the recipient site (fig. 1C). The constructed tube acted as the swing mechanism, allowing the transfer of the abdominal tissue and providing the mother blood supply to the transplant until a new supply developed. The abdominal donor site was closed by dermatome skin graft taken from the thigh. The meningomyelocele was prepared to receive the transplant by de-epithelization. The last operation consisted of removal of the connecting tube. This was performed three weeks after flap attachment to the recipient site.

From Brooke Army Hospital, Fort Sam Houston, Tex. Col. Soderberg is now assigned to U. S. Army Hospital, APO 180, New York, N. Y.

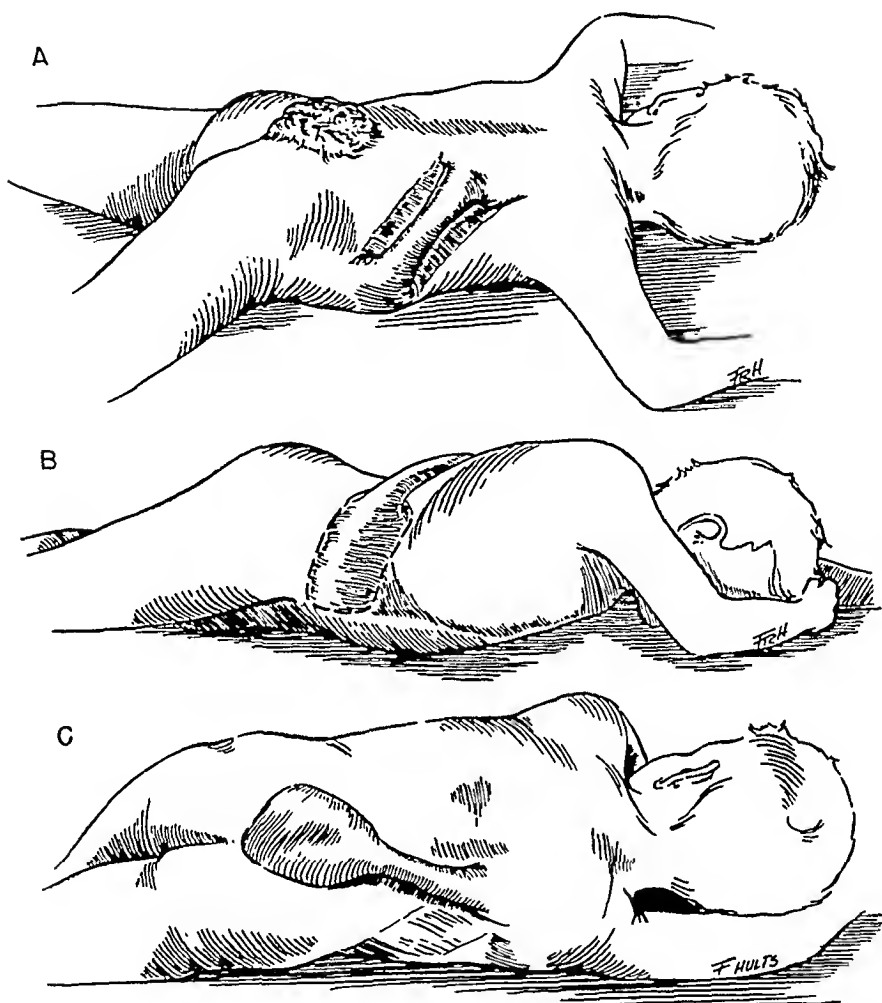


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The technic of plastic surgery described here is a rather large undertaking for employment in a young child. In the past, the methods of repair have consisted of fascial alterations or local revisions of soft tissues to obtain skin and subcutaneous tissues as a flap.

Adequate coverage eliminates the hazard of rupture, eliminates hypersensitive areas, and in this case offered a resilient covering permitting a modified valvelike action (fig. 2).

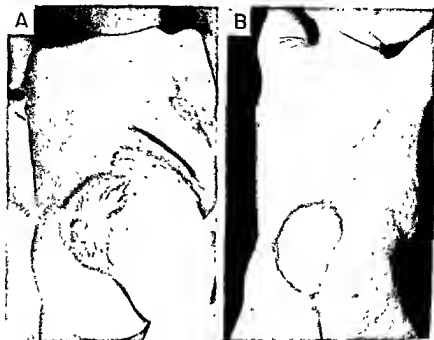


Figure 2. Appearance (A) before and (B) after flap transfer.

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#### THE OLDER PHYSICIAN

"Statistics show that 13,000 physicians in general practice are over sixty-five, which is the conventional age for retirement. Eight of every 10 physicians over sixty-five are still in active practice. One of every 2 in the group sees more than 40 patients in an average week. One of every 4 treats patients of all ages. One of every 4 will handle all types of cases."

## A MESSAGE FROM THE A. M. A.

This month our report concerns the Council on Mental Health of the American Medical Association.

In 1930 a temporary Committee on Mental Health was appointed by the American Medical Association Board of Trustees. This Committee submitted a report that was published in the Proceedings of the 84th Annual Session of the House of Delegates. The report dealt with many aspects of the problems relating to mental illness and health, including the scope of prevention and treatment of mental illness, the relationship between physicians and citizens' groups interested in mental health, the legal aspects of mental health, et cetera. A recommendation was made "that a standing Committee be appointed to take such steps as will enable the profession as a whole to assume leadership in mental health, which is its proper responsibility."

The Board of Trustees appointed a standing Committee in December 1951 and the first official Committee meeting was held in March 1952. Among areas selected for consideration by the Committee are: medical education in psychiatry; psychiatric units in general hospitals; stimulation of medical students and other medical personnel to train in the field of psychiatry; improvement of state mental hospitals and private psychiatric hospitals; laws relating to commitment to hospitals for the mentally ill; development of outpatient clinics (mental health clinics); and research in mental illness.

Serving under the Committee on Mental Health are two Subcommittees, a Subcommittee on Alcoholism and a Subcommittee on Narcotic Addiction. The primary purpose of the Subcommittee on Alcoholism is to stimulate the organization of medical programs on alcoholism through the appropriate committees of state and county medical associations. The Subcommittee on Narcotic Addiction's specific purpose is to make a detailed examination of the present status of narcotics and narcotic addiction as it relates to medical practice in the United States and to formulate for presentation to the Board of Trustees an official association point of view on the whole problem of narcotic addiction.

In addition to the two subcommittees, the Committee on Mental Health worked with the Bureau of Exhibits of the American Medi-

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From the Council on National Defense of the American Medical Association. The views and opinions expressed are not necessarily those of the Department of Defense.  
—Editor.

Adequate coverage eliminates the hazard of rupture, eliminates hypersensitive areas, and in this case offered a resilient covering permitting a modified valvelike action (fig. 2).

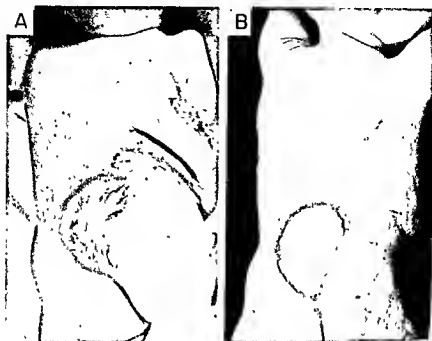


Figure 2. Appearance (A) before and (B) after flap transfer.

#### REFERENCE

- L. Soderberg, B. N.: Massive combined tube and open flap used as unity rotation pedicle transplant for repairs of certain deep surface defects. *Plast. & Reconstruct. Surg.* 3: 407-416, July 1948.

#### THE OLDER PHYSICIAN

\*Statistics show that 13,000 physicians in general practice are over sixty-five, which is the conventional age for retirement. Eight of every 10 physicians over sixty-five are still in active practice. One of every 2 in the group sees more than 40 patients in an average week. One of every 4 treats patients of all ages. One of every 4 will handle all types of cases.\*

—NICHOLAS S. SCARCELLO, M. D.  
in *New England Journal of Medicine*  
p. 744, Oct. 27, 1955

# Promotions of Officers

The following officers of the military medical services on active duty in the Army, Navy, and Air Force have recently received temporary promotions to the rank indicated.

## MEDICAL CORPS

ABBOTT, Joseph L., Capt., USAF  
 ABRAMS, Fredrick R., Capt., USA  
 ADAMS, Jerome M., Capt., USA  
 ALDERSON, Donald M., Col., USAF  
 ALEXANDER, John G., Capt., USAF  
 ALKIRE, Leonard E., Capt., USA  
 ANDREWS, Alan V., Capt., USAF  
 ANTICELLI, John R., Capt., USAF  
 ARWOOD, William C., Jr., Capt., USA  
 BAKER, Floyd W., Capt., USA  
 BALDWIN, Davis W., Capt., USAF  
 BARILA, Timothy G., Maj., USA  
 BARQUIST, Richard F., Maj., USA  
 BARRETT, C'Neill, Jr., Capt., USA  
 BEAUCHAMP, Charles J., Capt., USAF  
 BECKJORD, Philip R., Col., USA  
 BELLINGSH, William O., Jr., Lt. Col., USAF.  
 BERGER, Sheldon, Capt., USAF  
 BERGIN, James J., Capt., USA  
 BERMAN, Stanley, Capt., USA  
 BERREY, Bedford H., Maj., USA  
 BISHOP, Harry A., Capt., USAF  
 BLAKE, David F., Capt., USAF  
 BLAKELY, Gene T., Capt., USA  
 BOEHNING, Harold C., Capt., USA  
 BOEHRER, Philip M., Capt., USA  
 BOGER, John L., Capt., USAF  
 BOINET, John D., Capt., USAF  
 BORNSTEIN, Joseph H., Col., USA  
 BOSMAN, Robert L., Maj., USA  
 BOUZARD, Walter C., Capt., USA  
 BRESLIN, Harvey J., Capt., USAF  
 BROWN, Clement R., Jr., Capt., USAF  
 BROWN, Paul W., Maj., USA  
 BUSS, John E., Maj., USA  
 BURCOSS, Don C., Capt., USA  
 BURT, Howard, Capt., USA  
 BYNUM, Grover L., Jr., Capt., USAF  
 CAMPBELL, La L., Jr., Capt., USAF  
 CAMPBELL, Robert L., Col., USA  
 CANBY, John P., Capt., USA  
 CAREY, Philip O., Capt., USA  
 CARTER, Chapel E., Lt. Col., USAF  
 CASTELLOTT, John J., Capt., USA  
 CECCARELLI, Frank E., Capt., USA  
 CHAMBLIN, Stuart A., Jr., Capt., USA  
 CREITLIN, Melvin D., Capt., USA  
 CHOGICH, John C., Capt., USA  
 CLEMENT, James E., Capt., USAF  
 COHEN, Donald B., Capt., USAF  
 CONRAD, Marcel E., Jr., Capt., USA  
 COOK, Hugh H., Jr., Capt., USA  
 COURY, Oswald H., Capt., USA  
 COX, William A., Capt., USA  
 DACQUISTO, Michael P., Maj., USA  
 DAITCH, Martin H., Capt., USAF  
 DALSIMER, W. D., II, Capt., USA  
 DAVANAGH, John J., Lt. Col., USAF  
 DAVIES, James S., Capt., USAF  
 DAVIS, Edward H., Lt., USN  
 DAVIS, John M., Capt., USAF  
 DEAN, Gordon E., Capt., USAF  
 DEAN, Guy W., Jr., Lt. Col., USAF  
 DEAN, Harold N., Lt., USN  
 DEAN, Robert D., Capt., USAF  
 DEATON, Pleasant P., Capt., USA

DEES, Doyce B., Jr., Capt., USAF  
 DeHAAS, David R., Capt., USAF  
 DELIA, Claude W., Maj., USA  
 DEUBLER, Keith F., Capt., USA  
 DEVITA, Michael R., Capt., USAF  
 DEW, Ronald, Capt., USA  
 DILORENZO, Anthony, Maj., USA  
 DIMON, Joseph H., III, Capt., USA  
 DOBBEN, Glen D., Capt., USAF  
 DOCTOR, Leroy, Capt., USAF  
 DORMAN, Thomas W., Capt., USAF  
 DOSSETT, B. E., Jr., Capt., USA  
 DOUGLAS, William W., Capt., USAF  
 DOWNEY, Vincent M., Col., USAF  
 DUBUY, Carl T., Col., USA  
 DUFFIELD, John R., Capt., USA  
 DUNBAR, William F., Capt., USAF  
 DUNCAN, Julius S., Capt., USAF  
 DURIN, Peter R., Lt., USN  
 DURNELL, Monaford D., Lt., USN  
 EDELSTEN, Maurice G., Capt., USAF  
 EDGER, Herbert D., Col., USA  
 EINARSON, John, Capt., USA  
 EISNER, David G., Col., USA  
 ELLINGSON, Harold V., Col., USAF  
 ERB, Blair D., Capt., USAF  
 EWART, James A., Maj., USA  
 FEINGOLD, Albert H., Capt., USAF  
 FINCH, Charlie B., Capt., USAF  
 FINLEY, Robert H., Lt. Col., USAF  
 FITCH, Frank W., Capt., USAF  
 FITZGERALD, Joseph A., Capt., USAF  
 FOGLEMAN, James D., Capt., USAF  
 FRANKLIN, Burton M., Capt., USAF  
 FRASER, Richard S., Col., USA  
 GARBER, George L., Capt., USAF  
 GARVIN, Donald B., Capt., USAF  
 GERHARDT, William J., Capt., USAF  
 GIBBS, Winfield S., Capt., USAF  
 GIBLIN, Thomas J., Jr., Capt., USAF  
 GINSBERG, David K., Capt., USA  
 GORMAN, John R., Capt., USAF  
 GOOTHICK, Eugene Y., Capt., USAF  
 GORSUCH, George E., Lt., USN  
 GRANT, Willis J., III, Lt., USN  
 GRASMICK, Albert L., Capt., USAF  
 GREEN, Henry D., Capt., USA  
 GREENDYKE, William H., Capt., USAF  
 GREENSPAN, Gilbert, Lt., USN  
 GRIFFIN, Carl R., Jr., Capt., USA  
 GRIGGS, Oscar B., Col., USA  
 GUENTER, Kenneth E., Capt., USA  
 HAGGARD, David B., Capt., USAF  
 HAMATY, Daniel, Capt., USA  
 HAMBRICK, Claude S., Capt., USAF  
 HAMBRIGHT, Rufus R., Maj., USA  
 HARDIN, John B., Capt., USAF  
 HAYES, James C., Maj., USA  
 HENDERSON, Henry G., Capt., USAF  
 HENDERSON, John A., Lt. Col., USAF  
 HEIRY, Joseph R., Col., USAF  
 HERMAN, Robert H., Capt., USA  
 HILL, Frank D., III, Capt., USAF  
 HILLEY, Robert B., Capt., USAF  
 HOLDEN, Alfred M., Capt., USAF  
 HOLDEN, William B., Capt., USAF

cal Association to set up an exhibit on alcoholism that presents the current point of view concerning the treatment of alcoholic patients. The exhibit was first presented in the scientific exhibit at the June 1955 meeting of the Committee at Atlantic City. The exhibit is now available for presentation at state medical association meetings, and there have been calls for its use by outside groups.

In 1955, by action of the A. M. A. Board of Trustees, the Committee on Mental Health was given Council status. Since that time the work of the Council office has been steadily increasing. A conference of mental health representatives of the state medical associations, sponsored by the Council, was held on 18 and 19 September 1954 at Association headquarters. Representatives of 36 state medical associations were in attendance at the conference, which considered common problems now affecting the committees on mental health of the state medical associations and published conference proceedings. So successful was this first attempt that the representatives present unanimously agreed that the conference should be held annually. A second conference was held in November 1955, and a third is planned for November 1956.

During the past two years, the Council on Mental Health has been working closely with the American Psychiatric Association, and with representatives from a number of other organizations of national import, toward the creation of a Joint Commission on Mental Illness and Health. The results of this effort came to fruition late in 1955, with the formation of the Joint Commission on Mental Illness and Health, Inc. The purposes of the Joint Commission are: (1) to study mental illness and mental health and the medical, psychological, social, economic, cultural, and other factors that relate to the etiology and course of development of mental illness and to the advancement of mental health; (2) to study ways and means of furthering the discovery, development, and application of all effective methods, practices, and therapies for the diagnosis, treatment, care, and rehabilitation of the mentally ill and retarded and for the promotion of mental health.





JACKEY, James K., Capt., USA  
 JANS, Jack F., Capt., USAF  
 JASCH, Alan D., Capt., USAF  
 JENNINGS, William A., Capt., USA  
 JEWELLS, Robert W., Capt., USA  
 JOHNSON, Dale B., Maj., USA  
 JONES, Edward, Maj., USAF  
 JONES, James C., Capt., USAF  
 JONES, Kenneth F., Capt., USA  
 KAHLER, John T., Jr., Capt., USAF  
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 LOC, Richard W. L., Capt., USA  
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 LYTHYN, William J., Capt., USAF  
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 MENELL, Howard F., Capt., USAF  
 MENNER, Clifford A., Capt., USAF  
 MILLER, Charles D., Capt., USAF  
 MILLER, Claude R., Jr., Capt., USA  
 MILLER, Don L., Capt., USAF  
 MELLISAN, Vernon L., Capt., USAF  
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 MIYAHARA, Richard I., Capt., USA  
 MCFFETTY, Coleman J., Lt. Col., USA  
 MONTEMAYOR, G., Capt., USAF  
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 MURDOCK, Donald K., Capt., USAF  
 MURRET, Charles W., Capt., USAF  
 NACHT, Arthur L., Capt., USAF  
 NAGELE, Thomas E., Capt., USAF  
 NAGY, Alexander J., Capt., USA  
 NARDINE, John V., Capt., USA  
 NEE, Horst W., Capt., USA  
 NICHOLS, Wharton A., Capt., USAF  
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 NISHMAN, Leonard M., Capt., USAF  
 NOBLE, Richard J., Lt. Col., USA  
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 NORVAL, John C., Capt., USA  
 O'BRIEN, Eugene T., Capt., USAF  
 ORNSTEIN, David, Lt. Col., USA  
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 PLOTNIK, Gilbert, Capt., USAF  
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 REH, Christian F., Lt. Col., USA  
 REGER, Seymour J., Capt., USAF  
 RODGERS, Robert C., Capt., USAF  
 ROSS, Murray, Capt., USAF  
 ROWLEY, Neil L., Capt., USAF  
 RUSSELL, Richard B., Capt., USA  
 SAFAR, Mlo R., Capt., USA  
 SALOMONE, Gregory J., Capt., USA  
 SCHINDLER, James P., Capt., USAF  
 SCOLAMERO, Dominic F., Capt., USAF  
 SEAMAN, Charles D., Capt., USAF  
 SHEPARD, Walter L., Capt., USAF  
 SIMONDS, George N., Capt., USAF  
 SIMONS, Sheldon, Capt., USAF  
 SJOROD, Harold S., Capt., USAF  
 SKONEY, Daniel J., Capt., USA  
 SMITH, Harold D., Capt., USA  
 SMYTHE, Jack A., Capt., USAF  
 SWEAD, Moses P., Capt., USAF  
 SPARGO, William D., Capt., USA  
 SPENDLOVE, Clark, Capt., USA  
 SQUIRES, Robert L., Capt., USA  
 STAEUDLE, Helms H., Capt., USA  
 STEEL, Robert E., Jr., Capt., USA  
 STERN, Gerahon A., Capt., USAF  
 STEWART, Hugh A., Jr., Capt., USA  
 STEWART, Robert A., Capt., USAF  
 STOFHERD, John M., Capt., USA  
 STORY, Donald H., Capt., USAF  
 STOSICH, Kenneth E., Capt., USAF  
 STOVER, Donald R., Capt., USAF  
 STRAUSSBERG, Arthur, Capt., USAF  
 STRIZAK, Harvey E., Capt., USA  
 STYER, Donald J., Lt. Col., USA  
 SULLIVAN, James D., Capt., USAF  
 SULLIVAN, Robert B., Capt., USA  
 SURILLO, Feliceano, Capt., USA  
 SWENSON, Ralph D., Capt., USAF  
 SWIFT, Robert F., Capt., USAF  
 TAYLOR, Roy M., Capt., USAF  
 THOMPSON, Calvin W., Capt., USA  
 THOMPSON, Maeco B., Capt., USAF  
 THOMPSON, William J., Capt., USA  
 THOMPSON, L. E., Jr., Capt., USA  
 TOOVY, Samuel, Capt., USAF  
 TORRES-BERRIOS, C. A., Capt., USA  
 TSCHUDY, Robert M., Capt., USAF  
 UNDERWOOD, Robert J., Capt., USAF  
 UTTERBACK, Robert, Capt., USA  
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 WEISER, Henry J., Lt. Col., USA  
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 WRIGHT, Charles I., Capt., USA  
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 ZIGRANG, Richard C., Capt., USA  
 ZOHL, Robert J., Capt., USA

## NEW OFFICERS OF MILITARY MEDICINE SECTION, A. M. A.

At the recent meeting of the Section on Military Medicine, Scientific Assembly of the American Medical Association, held in June 1956, in Chicago, Ill., the following officers were appointed to serve for the 1956-1957 term:



*Russel V. Lee, M. D., Palo Alto  
Clinic, Palo Alto, California  
(Chairman)*



*Silas B. Hays, Major General, MC,  
USA, Surgeon General, U. S. Army  
(Vice Chairman)*



*Cecil L. Andrews, Captain, MC, USN,  
Bureau of Medicine and Surgery  
(Secretary)*



*Charles L. Leedham, Colonel, MC,  
USA (Ret.) (Delegate to Section  
on Military Medicine)*

## MAYO CLINIC SURGEON APPOINTED REAR ADMIRAL, U. S. NAVAL RESERVE

Dr. Waltman Walters, head of a section of Surgery at the Mayo Clinic, Rochester, Minn., became the third member of that clinic staff to achieve the rank of Rear Admiral in the U. S. Naval Reserve. Dr. Walters served as Chief of Surgery at several U. S. naval hospitals and as consultant to the Third Fleet in the South Pacific.



Dr. Waltman Walters, right, receiving his commission as Rear Admiral, U. S. Naval Reserve. On the left is Rear Admiral Walter F. James, MC, USN, District Medical Officer, Ninth Naval District. Also attending the ceremonies are two other Mayo Clinic staff members: W. McK. Craig (second from left) and T. B. Magath, both Rear Admirals, MC, U. S. Naval Reserve.

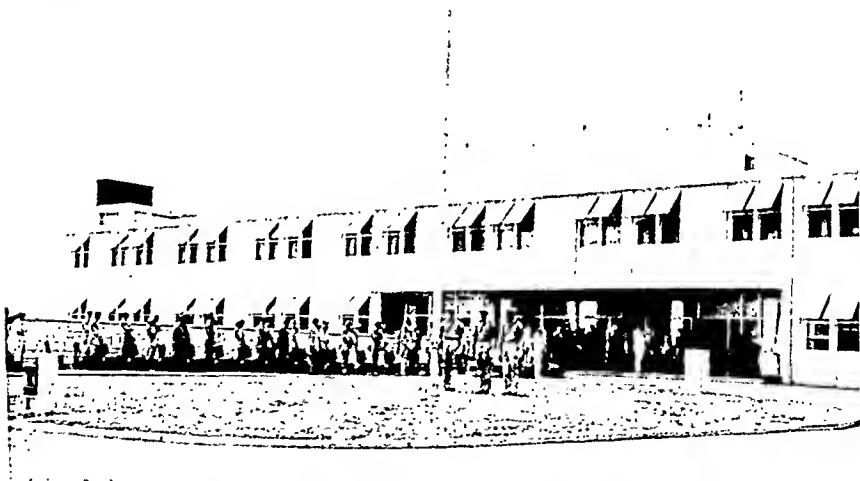


# NEW AIR FORCE HOSPITAL IN BERMUDA

FRANK B. BERRY, M. D.

Assistant Secretary of Defense (Health and Medical)

**T**HIS most felicitous occasion calls to mind that hardy band, the Adventurers of Bermuda, who first settled here almost three and a half centuries ago. Personally, it takes me back 30 years when I first set foot upon this enchanted soil of Caliban. Although we hear much in the papers these days of rock and roll and the young, I assure you that those of us who came to Bermuda in earlier days were well aware even then of the significance of that phrase, as we rocked, rolled, and pitched on the S. S. *Fort George*—and of our relief as we passed Murray's Anchorage and reached the quiet haven of the harbor. A few years later there were the happier days of the "Monarch" and the "Queen," which with their added beauties and refinements assuaged even the discomforts of the restless gulf stream. I look back upon those years with great fondness because then you had your beautiful cedars, the island was quiet, and there were no automobiles.



Twenty years intervened, until one day last December I landed here at this base with representatives of the offices of our three Surgeons General, members of my Council, and others from our Department of Defense. We were most cordially and generously received by Colonel

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Excerpt from address at the dedication of the new hospital, Kindley Air Force Base, Bermuda, 21 June 1956.

Peterson and his Command at Kindley Air Force Base. Naturally, we were most interested in the building of this beautiful new hospital that we are here to dedicate today.



*Dedicatory address is presented by Doctor Frank B. Berry, Assistant Secretary of Defense (Health and Medical).*

We trust that it will serve as another tie in our enduring friendship. We know it will care for our Air Force and Navy, and we hope it may also prove to be a boon and symbol of mercy to you in Bermuda, always ready to provide for you as it does for our own, should ever the need arise. We pray that this may never happen in any large sense, but we realize that our lives are fraught daily with the dangers of illness and accident, and you may be sure that this hospital will always be willing to render aid to you of these islands and to those of our brothers in arms from the United Kingdom who may be stationed here.

During the war years and ever since, we have been grateful for your assistance and understanding in the need for outlying stations in the defense of our world. In this world today, more restless even than the seas about you and overwhelmed by two severe storms within my own period of adult life, we and our kith and kin must always stand together and work shoulder to shoulder to maintain that freedom and free interchange which is inherent within you and within us; and by so doing we

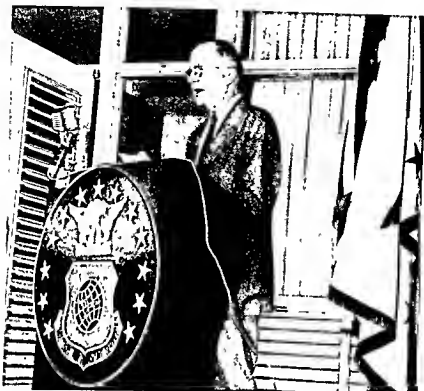
hope that we may bring about a more tranquil and peaceful world with right morals, strength, and a spirit of fellowship among men.



*Distinguished guests at the dedication included His Excellency the Governor of Bermuda, Lieutenant General Sir John Woodall, K. B. E., C. B., M. C.; Doctor Frank B. Berry, Assistant Secretary of Defense (Health and Medical); Rear Admiral Bruce E. Bradley, MC, USN, Deputy Surgeon General, U. S. Navy; and Major General William H. Powell, Jr., USAF (MC), Deputy Surgeon General, U. S. Air Force.*

The new hospital at Kindley Air Force Base is of modern design and has many attractive features. All areas directly serving patients are air conditioned, the public corridors are lined to a height of five feet with a washable plastic material, and fluorescent lighting is installed throughout. A music distribution system feeds four separate music or radio programs into earphones or pillow speakers at each bed, with selector switches individually operated. Every bed is provided with an audiovisual nurses' call system connected with the primary nurses' station. This allows for a two-way conversation between patient and nurse, thereby saving the nurse many steps and making possible more efficient and prompt service to the patient. There also is an interoffice communication system linking the major professional and administrative offices of the hospital.—Editor

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## CORRESPONDENCE

*To the Editor:*—I think it should be called to the attention of your readers that Major Joseph Crampton's statement regarding the diagnosis in the case of systemic lupus erythematosus, presented in the CPC on Page 695 of the May 1956 issue of the *U. S. Armed Forces Medical Journal*, to the effect that the presence of bullous skin lesions in systemic lupus erythematosus "constitute the picture that we term the Senear-Usher syndrome," is based on a misapprehension.

This point of confusion was commonplace during the early years of discussion of the nature of the Senear-Usher syndrome. It was beginning to be apparent as long ago as 1940, however, and has been firmly established during the past ten years, that the occurrence of bullous lesions in systemic lupus erythematosus is merely an occasional manifestation of that protean disease, and has nothing whatever to do with the Senear-Usher syndrome. The latter is merely a variety of pemphigus, now known properly as pemphigus erythematosus. It bears no relationship whatever to lupus erythematosus except for the not infrequent clinical mimicry of facial lesions of discoid lupus erythematosus, especially during early phases of the disease. If any reasonable evidence of lupus erythematosus can be established in patients thought originally to have the Senear-Usher syndrome or pemphigus erythematosus, the diagnosis then becomes lupus erythematosus and the diagnosis of pemphigus, or Senear-Usher syndrome, is discarded.

HARRY L. ARNOLD, Jr., M. D.  
Straub Clinic  
Kapiolani Street  
Honolulu 14, T. H.

## Reviews of Recent Books

THE CYTOLOGY AND LIFE-HISTORY OF BACTERIA, by K. A. Bisset, D. Sc.  
2d edition. 164 pages; illustrated. The Williams and Wilkins Co., Baltimore, Md., 1955. Price \$6.

In this monograph the author discusses technic, structures of bacteria, reproduction and life cycles, macroformations, and the evolutionary relationships and generics of bacteria. The chapter on technic describes various procedures for mounting and staining of bacteria and electron and phase microscopy in general rather than specific terms. Surface structures and the bacterial nucleus are covered in separate chapters. The discussion and illustrations of the cell wall and cell membrane and their behavior during cell division are most interesting, as is the material presented on flagella. The chapters on reproduction and sexuality in bacteria cover the various processes whereby propagation is accomplished. Vegetative reproduction may be simple or complex, asexual or sexual. Of special interest to the reviewer was the chapter on the evolutionary relationships of bacteria, particularly the concept that bacteria evolved parallel with other groups of living organisms from an aquatic to a terrestrial mode of life and that the spirillum is the most primitive and most probable ancestral bacterial form.

Throughout the book the text is accompanied by excellent photomicrographs and line drawings which admirably illustrate the material covered. Each chapter has a brief summary and is followed by a bibliography. Most of the references cited are recent, within the past 20 years, attesting to the increasing interest in the finer structures and life histories of bacteria.

Although this volume offers little of immediate practical value to the physician, those who are interested in medicine in its broadest aspects can read it with pleasure and profit. The book is recommended for the laboratory worker, particularly the bacteriologist.

—HUGH B. HOEFFLER, Lt. Col., MC, USA

IONIC INTERPRETATION OF DRUG ACTION IN CHEMOTHERAPEUTIC RESEARCH, by Alexander V. Tolstoubov, M. D., Ph. D. 276 pages; illustrated. Chemical Publishing Co., Inc., New York, N. Y., 1955. Price \$10.

This overpriced monograph is a compilation of data from a wide variety of sources and is presented by the author as evidence supporting his thesis that relative biologic action is determined by such physiochemical properties of compounds as dissociation constants, isoelectric points, and solubilities; he questions the validity of structural relationships as controlling relative activity of drug series. His idea has interesting and appealing points but is not clearly nor felicitously de-

veloped, not is it apparent why, from his point of view, all substances with the same isoelectric point, for example, do not have the same biologic action. In many instances the locutions employed suggest that English is not the first language of the author. Some citations in the bibliography are inconsistent, and some entries show carelessness or lapses in proofreading.—*ELIZABETH R. B. SMITH, Ph. D.*

**THE HOUSE PHYSICIAN'S HANDBOOK**, by *C. Allan Birch, M. D., F. R. C. P.* 160 pages. The Williams & Wilkins Co., Baltimore, Md., 1955. Price \$3.

This little pocket-size book contains a considerable amount of information relative to the day-to-day tasks of the house physician. It is well made and the print is large and clear. The over-all size of the volume is 5 by 7½ inches. It contains many charts and tables, including one of words and phrases in English, French, German, and Italian, which may be used by the physician faced with a patient who speaks no English.

Although it was written primarily for the house physician in Great Britain, most of the material is applicable here. It begins with some information on the general duties, etiquette, and conduct of the house physician and includes material on clinical procedures, clinical pathology, and treatment. Some of the material is not usually found in handbooks of this kind. For example, it contains information concerning the following: deathbed wills, dying depositions and declarations, embalming, baptism (emergency baptism by the physician), bleeding tooth socket, fixed wedding ring, and tracheotomy (emergency). Much of the material is so basic, however, that this volume would be more useful to the medical student and intern than to the resident physician.—*WILLIAM C. MARETT, Lt. Col., USAF(MC)*

**TEXTBOOK OF OCCUPATIONAL THERAPY**, with Chief Reference to Psychological Medicine, by *Eamon N. M. O'Sullivan, M. B., D. P. M.* 319 pages; illustrated. Philosophical Library, Inc., New York, N. Y., 1955. Price \$10.

It is important for those who are searching for reference material in occupational therapy to note particularly the subtitle of this book. The author deals almost entirely with psychiatric occupational therapy. Although occasional references are made to medical, surgical, and orthopedic problems, these are not discussed in any detail. The opening chapter on the history of occupational therapy is interesting and informative.

Although this book is of a reference and technical type, it is easy to read. Dr. O'Sullivan has a pleasing and striking descriptive ability in his writing, which may be illustrated by his use of the following analogy. The point of discussion is to emphasize the importance and recognition of occupational therapy as a therapeutic agent. "The curative aspect is to occupational therapy what the soul is to the body. It is the vital principle which gives life and without which the treatment is no

longer a treatment—it is merely an inanimate body, which is devitalized, inert, and useless. The soul or therapy is gone and the lifeless body or occupation is all that remains.”

Most activities for patients mentioned in this book have to do with the industry and maintenance of a large institution. Too often this type of occupational therapy can be mistreated and the therapeutic value for the patient is overshadowed by the economic needs of the institution. The author illustrates how both may be accomplished effectively through proper organization, administration, and supervision.

—ELIZABETH M. NACHOD, *Capt., AMSC, USA.*

ANNALS OF THE NEW YORK ACADEMY OF SCIENCES, Volume 60, Art. 6, Pages 807-964, April 30, 1955. Editor: *Roy Waldo Miner*. "Instrumentation." Conference Chairman and Consulting Editor: *Joseph Greenspan*. 157 pages; illustrated. The New York Academy of Sciences, New York, N. Y., 1955. Price \$3.

This booklet is a very brief but good attempt by 16 contributors to describe the vast field of instrumentation in a philosophic, theoretic, and somewhat practical manner. The booklet is divided into three parts:

Part I, "The Science of Instrumentation" (26 pages), is purely philosophic and explains how human attributes and limitations prevail in the design and use of instruments for specific purposes.

Part II, "The Transmission of Instrument Requirements and Specifications" (40 pages), is mainly theoretic and could have been condensed. This part also tends to be practical in describing specific instruments for biologic use. The contribution by Grundfest may be of interest to those working in electrocardiography, neurophysiology, and related fields because he describes the theory of the process of bioelectric potential production and how it is detected.

Part III, "Some Examples of the Use of Analog Instruments" (87 pages), is the most practical part of the booklet. This section shows how models, electrical and electronic circuits, and other methods can be used to set up analogous systems to explain various phenomena in other fields. Methods such as the use of surgical rubber dam sheet stretched and sagged into some special shape with special lighting effects, an electrolytic tank, a running layer of water containing slowly-dissolving crystals of permanganate, all to obtain equipotential lines, et cetera, are described as a means of explaining various natural phenomena and solving mathematical problems. A very brief summary of transducers (converters of energy into current and voltage) is included, as could be expected.

The booklet in a general way expresses the idea that in order for man to understand and improve his environment and himself, he should be able to apply what he can easily understand and master in one field to what is difficult for him in another field, specifically the biologic

field. Imagination, man's unique and most precious gift, is his most important tool in performing these processes of comparison, elimination, differentiation, et cetera, that are so useful in natural philosophy. A great number of scientific theories, developments, and inventions have been made based on imaginative thinking and making analogies. One specific example of drawing analogies is giving to the atom, which man has not actually seen, a structure like our solar system, and from this bit of imagination atomic energy is obtained!

The booklet is not intended for study or for explaining electronics, et cetera, in detail. The average physician would not be interested in it, but it could be recommended to him for a few quiet evenings.

—IRVIN LEVIN, PA D

ANNALS OF THE NEW YORK ACADEMY OF SCIENCES, Volume 60, Art. 5, Pages 541-806, April 27, 1955. Editor: Roy Waldo Miner. "Recent Advances in the Study of the Structure, Composition, and Growth of Mineralized Tissues." Conference Co-Chairmen: Roy O. Greep and Albert E. Sobel, Consulting Editor: Roy O. Greep. 265 pages; illustrated. The New York Academy of Sciences, New York, N. Y., 1955. Price \$4.

This is a series of papers published as a result of a conference on mineralized tissues held by the Section of Biology of the New York Academy of Sciences. It brings together an imposing group of experts in the field of electron microscopy, x-ray diffraction, histochemistry, radiobiology, and microchemical and crystallographic methods of analysis of the mineralized tissues.

These papers reveal the dynamics of the calcified tissues. Each paper illustrates clearly and concisely how the essential elements are constantly turned over and renewed within the skeleton and the teeth. They metabolize, adapt, and respond. They are constantly undergoing change, and contribute with remarkable facility to the ionic equilibrium of the body fluids.

This book paints as definitive a picture as is possible of the present state of knowledge concerning the mineralized tissues. An exchange of ideas is presented that may spotlight new paths of investigation.

This is an excellent reference book for investigators interested in this field. The complete bibliography following each paper enhances its value to the interested investigator.

—THEODORE E. FISCHER, Col., USAF (DC)

ANNALS OF THE NEW YORK ACADEMY OF SCIENCES, Volume 61, Art. 4, Pages 737-1064, September 27, 1955. Editor: Roy Waldo Miner. "Biology of Poliomyelitis." Conference Chairman and Consulting Editor: Karl Habel. 328 pages; illustrated. The New York Academy of Sciences, New York, N. Y., 1955. Price \$5.

This collection of papers is the result of a conference on the biology of poliomyelitis, sponsored by the Section on Biology, New York Academy of Sciences, in January 1955. It consists of 37 individual papers,

each by an authority in the field, which are organized into the following major groupings: Part 1. Poliomyelitis Virus and Methods for Its Study. Part 2. Susceptibility of Cells and Organisms to Poliomyelitis. Part 3. Poliomyelitis Virus Variation. Part 4. Poliomyelitis Virus and the Community. Part 5. Immunization Against Poliomyelitis.

As might be suspected from the main group titles, these papers are not for casual reading. Parts 1, 2, and 3 will have little appeal to the majority of physicians interested in clinical medicine, but provide an extremely compact and authoritative reference source for those having a greater interest in the basic laboratory problems related to the diagnosis and prevention of poliomyelitis. Papers in parts 4 and 5 should be read by every physician who is in clinical practice, as they illustrate most of the basic principles of epidemiology and immunology of the disease. Of particular importance are the longitudinal studies of Hammond and his colleagues on Navy families in the Philippines, which illustrate so well the high infection rates without clinical illness. The final paper by G. S. Wilson outlines many of the still unanswered questions and problems, and predicts those things that may come within the next three decades.

This is a book that belongs in every medical library.

—JOHN R. SEAL, *Capt., MC, USN*

200 MILES UP, *The Conquest of the Upper Air*, by J. Gordon Vaeth, Head, New Weapons and Systems Division, U. S. Navy Special Devices Center, Office of Naval Research. 2d edition. 258 pages; illustrated. The Ronald Press Co., New York, N. Y., 1955. Price \$5.

This second edition of this book modernizes an absorbing account of the history and current program of the United States in upper air research and flight at extreme altitudes. The reader is first introduced to the physical characteristics of the great air ocean around us, from the earth's surface to the estimated top of the atmosphere, 200 miles or more aloft. The instruments and scientific methods used to measure physical and chemical phenomena such as atmospheric composition, winds, pressures, temperatures, ion densities, solar radiation, cosmic radiation, and meteors receive a careful and pleasingly lucid treatment. Special sections of the book are devoted to the vehicles used for this research—the 120,000-foot Skyhook balloon, the V-2, Aerobee, and Viking sounding rockets. One learns details of their construction, power supply, control methods, instrumentation, and flight capabilities as well as a concept of the scientific data that have been won by means of these spectacular devices. The author includes stimulating accounts of the principal scientists involved, stories of human drive, vision, tenacity, and frank heroism in this technical crusade toward space. Excellent photographs and diagrams abundantly illustrate the text.

Two especially noteworthy chapters bring the story to a close. One describes the United States' program to build and fire into its orbit sometime in 1957 or 1958 the first (we hope) artificial, unmanned earth

satellite. Designed to circle the globe some 200 to 300 miles up at a velocity of 5 miles per second, this unique device will observe and transmit to ground receiving stations an astonishing variety of scientific data such as solar and cosmic radiation, aurora particles, earth's cloud cover, and meteor dust impacts. The closing chapter is a thought-provoking forecast of man's technical progress which will eventually lead to true space travel. Overcoming obstacles in an orderly way, says the author, man one day will almost certainly realize his great dreams of interplanetary and interstellar travel. The foundations of this ultimate achievement are the world's programs of research and development—past, present, and planned. The singular importance, in this respect, of the research described is immediately apparent.

*200 Miles Up* is written in a clear, easy style which should make it equally appealing to the layman, the student, and to specialists in other scientific fields who want to familiarize themselves with the inspiring and challenging frontier located at such a relatively short distance straight up.—JOHN M. TALBOT, Col., USAF (MC)

A DICTIONARY OF TERMS IN PHARMACOGNOSY, AND OTHER DIVISIONS OF ECONOMIC BOTANY, by George Macdonald Hocking, Ph. D. 284 pages. Charles C Thomas, Publisher, Springfield, Ill., 1955. Price \$9.75.

This compilation of words and expressions relating principally to natural medicinal and pharmaceutical materials, and the plants and animals from which they are derived, is, according to the author, "designed to meet the special needs of students and practitioners in the various health professions, of people in trade and industry, and of others interested in learning more about useful plants and animals."

Although the utmost credit is due any author who would attempt to compile a dictionary of this type, it is doubtful if any of the purpose has been achieved except that portion referring to the needs of students and practitioners. As reference material for those engaged in the study of pharmaceutical materials, this volume is of unlimited value. There has always been the need for a comprehensive and convenient listing of facts such as are found in this dictionary. The coverage of material is excellent, although the definitions are not uniform in the amount of material furnished. This is obviously due to the desire to keep the volume to a reasonable, convenient size.

As for the "people in trade and industry," and those "interested in learning more about the useful plants and animals," it is believed that a more complete and interesting discussion of each item will be sought, even at the expense of the time and energy required to obtain this information from other sources.

The appendixes are a valuable addition to the volume and contain much in the way of useful, sought-after information.

—ELWOOD M. WRIGHT, Col., MSC, USA

THE MEDICAL DEPARTMENT OF THE UNITED STATES ARMY. United States Army Dental Service in World War II, by *George F. Jeffcott*, Colonel, DC, USA. 362 pages; illustrated. Prepared in the Historical Unit, Army Medical Service. Editor-in-Chief, Colonel *John Boyd Coates, Jr.*, MC. Office of the Surgeon General, Department of the Army, Washington, D. C., 1955. For sale by the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C. Price \$3.25.

A wealth of detailed and well-documented information on all aspects of the Dental Service operation during World War II is contained in this recently published work.

Historical material dating back to the beginning of organized military dentistry and continuing through World War I and the years following that conflict furnishes an excellent background for the chapters that follow. Administration, procurement and training of personnel, equipment and supply, and operation of the Dental Service in the Zone of Interior and in Theaters of Operation are all thoroughly covered in this volume, with a closing chapter on demobilization.

Throughout the text, the author presents an unbiased and factual discussion of interprofessional problems encountered at all levels of operation.

The book is more than a history in that it contains many charts, graphs, and extracts of regulations and official communications, providing detailed and authoritative data on the immensity of the task faced by the Dental Service.

Officers of the Army Dental Corps and other service dentists, especially those concerned with staffing and procurement, will benefit from a thorough reading of this excellent publication.

—DONALD C. HUDSON, Col., USAF (DC)

QUICK REFERENCE BOOK FOR NURSES, by *Helen Young*, R. N., and *Eleanor Lee*, R. N. 7th edition. 727 pages; illustrated. J. B. Lippincott Co., Philadelphia, Pa., 1955. Price \$4.

This is an extensive revision of a standard reference book for nurses which, prior to this edition, was last revised in 1950. The sections on pharmacology, medical and surgical nursing, nursing technics, diet therapy, and maternity nursing include many changes in the treatment of patients that have taken place during the past five years. The section on pharmacology is particularly excellent. Discussion on obsolete drugs has been deleted while much has been added concerning new drugs. Another new feature is the alphabetical index.

This book is highly recommended for both student and graduate nurses and should be made available to ward libraries. The compact size makes it ideal for nurses in private practice who wish to have an easy reference book at hand. It would also provide quick refresher material for nurses who have been inactive in the field of nursing and wish to return to an active status.—ANN M. WITCZAK, Maj., ANC, USA



THE YEAR BOOK OF PEDIATRICS (1955-1956 Year Book Series), edited by Sydney S. Gellis, M. D. Isaac A. Abt, M. D., Editor Emeritus. 431 pages; illustrated. The Year Book Publishers, Inc., Chicago, Ill., 1955. Price \$6.

This Year Book consists of well-written condensations of appropriately selected articles from 84 different journals received from June 1954 through May 1955.

The selections were well chosen to present a balance in fields particularly pertinent to the pediatrician and to include new subjects, previously neglected subjects, and controversial articles. Some of the latter were controversial in that they were possibly misleading by title or by emphasis. Some articles were apparently chosen as object lessons, such as the eight cases of Kaposi's varicelliform eruption. The editor's comment emphasized the "hazard of admitting patients with eczema to a ward housing a patient with Kaposi's varicelliform eruption."

Some 70 succinct comments by the editor and 96 solicited comments from well-chosen consultants greatly enhance the value of this book by presenting another viewpoint on controversial subjects.

I was particularly interested to note that over 40 per cent of articles selected were taken from journals published outside the United States and that only about one third of all the articles were from *Pediatrics*, *The Journal of Pediatrics*, and *The American Journal of the Diseases of Children* combined.

Articles are grouped by subject in 18 major divisions with liberal cross references and adequately indexed so that the reader can easily find, compare, and evaluate for himself current theories and findings.

—JOHN P. FAIRCHILD, LL. CO., MC, USA

POLYCYTHEMIA, Physiology, Diagnosis and Treatment Based on 303 Cases, by John H. Lawrence, M. D., D. Sc., F. A. C. P. 136 pages; illustrated. Modern Medical Monographs Number 13. Grune & Stratton, Inc., New York, N. Y., 1955. Price \$5.50.

This little book by the foremost authority on this disease presents another excellent summary of present knowledge of polycythemia in all its forms. Dr. Lawrence first applied artificial radioactive isotopes therapeutically in 1936. Their first polycythemia patient was treated in 1938 and is still living at age 72. Nearly normal life expectancy has been achieved through radioactive phosphorus in the treatment of polycythemia vera. It was the reviewer's privilege to attend a postgraduate symposium 10 years ago, at which time conclusive evidence of control of this blood disorder had already been established. Since that time considerable refinement in diagnosis, classification, therapy, and management has been realized. Furthermore, the prognosis can be confidently predicted.

In addition, this monograph includes the discussion of "relative polycythemia" and "secondary polycythemia." The distinction is im-

portant for those planning to qualify for specialty status. Many textbooks still contain erroneous information which arose from confusion of these two conditions with the disease first described by Vaquez and Osler. Pertinent case histories and excellent charts, graphs, nomograms, and color photographs are included. Also, a summary of post-mortem findings on 21 cases is tabulated.

The exhaustive list of 209 references is undoubtedly the most elaborate ever compiled. The index is adequate for a small monograph.

Many technical points of interest both to the average clinician and the hematologist appear throughout the book. It is easily read, is recommended as a final authority for students and clinicians, and should serve as a reliable reference for those who infrequently are confronted with the differential diagnosis and therapy of polycythemia.

—JACK C. SHRADER, Lt. Col., USAF (MC)

THE PHYSICIAN AND THE LAW, by Rowland H. Long. Foreword by Milton Helpern, M. D. 284 pages. Appleton-Century-Crofts, Inc., New York, N. Y., 1955. Price \$5.75.

This practical study forces a physician to look at himself through a lawyer's eyes. Written in terse, legal style, its compact size is deceptive as to scope, detail, and excellent documentation (369 topical references). In a way, it is complementary to that monumental work on forensic medicine of the New York region, *Legal Medicine, Pathology and Toxicology* by Gonzales, Vance, Helpern, and Umberger.

Likewise, the author shows a physician how his legal colleague tries to think and write, to be coolly objective and rational, and to be partisan without being unfair or ignorant of the other side of the argument. Also, the writer's message can help teach what most physicians learn too late—that the law in practice is neither a Hollywood show nor a set of formulas. Too often, a physician in legal matters is as out of step as a man who tries to play chess without knowing the rules. A legal action seeks a decision acceptable to society. This is the fundamental aim of legal conflict, not the interesting and even possibly important side issues that may be evoked. Much of the pattern and formality of modern American law shines through this book.

The preface sets forth two purposes—to afford some knowledge of the rules of law involving physician-patient relationships, and to help the physician who has to appear in court as a witness. The author secondarily and possibly unwittingly indicates the importance he ascribes to the different aspects of his study by the number of pages he devotes to each subject. Roughly, 20 per cent of the book is on malpractice, the same amount on sudden and unexpected death, a bit less on the physician as an expert witness, about 10 per cent on the physician and the criminal law, and 10 per cent on blood tests and transfusions, with lesser discussion of commitment of the insane, artificial insemination, adoption, licensure, workmen's compensation, and insurance. Much of current interest in more general or administrative areas has been omit-

ted, particularly regarding the cocooner system, public health and governmental medicine, and industrial practice.

While much in this work is technical and for reference, it also concerns two areas that can cause difficulty and some embarrassment to all physicians. The first is the increasing demand for scientific evidence and for expert medical testimony. The author tells the physician as an expert what his good sense should suggest, that he is not expected to be omniscient but merely well prepared, modest, and understandable. He should answer the question asked, but not hesitate to admit ignorance. He should remember that his answers are ultimately weighed for value by the judge and the jury and not by the examining attorney. The second problem all physicians have is the increasing liability of being involved in a malpractice suit. One can quote the legal saw, "sue him with the deepest pockets," to explain this increase but there may be more to it than that. The writer discusses past causes for suits for damages, prophylactic steps to avoid these situations, and the defenses once involved.

This is a rather shocking book for the average physician. It describes the dangers and perils of practice, as well as some incompletely understood duties to society. While it could be considered a basic reference for lawyers, any physician can well afford this meaty, small volume in his library and, in any event, should remember to mention it to his own legal counselor or colleague in any future affair involving the physician and the law.—CARL J. LIND, Jr., Col., MC, USA

**TOPLEY AND WILSON'S PRINCIPLES OF BACTERIOLOGY AND IMMUNITY.** Volumes I and II. By G. S. Wilson, M. D., D. P. H., and A. A. Miles, M. D. 4th edition, 2,330 pages; illustrated. The Williams & Wilkins Co., Baltimore, Md., 1955. Price \$24.50 for set of two volumes.

The nine-year interval between the third and fourth editions of this standard text has witnessed numerous developments in the field. In accomplishing the task of extensively revising their volumes, the authors have chosen to revise on a chapter-by-chapter basis rather than use an entirely new format. This has been successfully accomplished by enlarging the text by over 200 pages and adding extra figures and tables.

Some of the more notable features of the revision are found in the chapters dealing with the sources and effects of the newer antibiotics, bacterial genetics (including discussions of such notable advances as the phenomena of recombination and transduction), and the sections on virology.

The text is well written and ideas are clearly expressed. The print is easily read and, although there is a slight glaze to the paper, it is not fatiguing to the eyes. The binding is sturdy and well styled as is typical of books from this publisher. In general, the figures are of good quality, but the lack of color plates is quite obvious.

There is no doubt that the authors have made a very successful revision of their text, but in so doing, have pushed it further into the classification of a reference work to be used and enjoyed primarily by workers who are already well established in the field. The voluminous accumulation of facts makes the book a rather dubious source of general knowledge for the general practitioner.

—BRUCE H. SMITH, *Comdr., MC, USN*

MEDICAL AND PSYCHOLOGICAL TEAMWORK IN THE CARE OF THE CHRONICALLY ILL, edited by *Molly Harrower*, Ph. D. American Lecture Series, Publication No. 276, A Monograph in The Bannerstone Division of American Lectures in Psychology, edited by *Molly Harrower*, Ph. D. 232 pages. Charles C Thomas, Publisher, Springfield, Ill., 1955. Price \$5.75.

This monograph presents the proceedings of a three-day conference on problems relating to medical and psychologic teamwork in the care of the chronically ill. Participants in the conference were chosen from the professional ranks of internists, clinical psychologists, and psychiatrists. The text includes chapters on the care and treatment of the chronically ill, psychologic problems of the chronically ill, problems of teamwork in the care of the chronically ill, problems in teaching and training medical and psychologic personnel for the care of the chronically ill, the pros and cons of a new medical discipline, problems of interdisciplinary research in the care of the chronically ill, and communication in teamwork for the chronically ill.

Each chapter consists of several papers in the same topic area. The proceedings are somewhat related to two main questions: (1) What can be done to assist the general practitioner and the internist to handle effectively the psychologic problems which arise in his chronically ill patients? (2) What can be done to make effective use of the technics of clinical psychology?

There is great variability in quality of the papers in the monograph, and it appears that much would be gained by a better organization and editing of the many sections. Of outstanding interest, although its relationship to the central topic is somewhat questionable, is the chapter by Kubie: "The Pros and Cons of a New Profession: A Doctorate in Medical Psychology." Among the papers are several which do not appear relevant to the problem under discussion and which might profitably be excluded from the monograph. Some of the participants show keen perception for the problems involved in psychologic teamwork in handling chronically ill patients. Their contributions appear to be well thought out, clearly presented analyses. On the other hand, some of the speakers failed to grasp the significance of the problem.

In view of the above criticism, it appears that the title of the monograph is somewhat misleading, and it is believed that this monograph would be of limited value as an explanation and elaboration of medical and psychologic teamwork in the care of the chronically ill.

THE RELIEF OF SYMPTOMS, by *Walter Modell, M. D., F. A. C. P.* 450 pages. W. B. Saunders Co., Philadelphia, Pa., 1955.

This book provides a practical guide for the relief of distressing symptoms, an important phase of medical care which has in recent years received too little attention. This unique book is based on the belief that by relieving symptoms and attacking the basic cause of the disorder at the same time, the doctor-patient relationship is improved and better results are obtained. The book is addressed largely to medical students and younger graduates in an effort to explain principles as well as provide detailed information in the art of making patients feel better. Even though the book is directed toward younger physicians, older practitioners will find it full of helpful suggestions, some of which may be new or almost forgotten because of the present trend of attacking the cause of illness rather than providing only symptom relief.

The author discusses the different drugs and other modalities commonly used to provide relief of various symptoms, and effectively evaluates those which have been found to be most useful and those which must be used with care or not at all because of undesirable side effects. The book consists of 30 chapters, the first five of which are devoted to theory. Twenty-four chapters are devoted to describing measures designed to relieve specific symptoms such as pain, anxiety, insomnia, gas, constipation, diarrhea, loss of appetite, obesity, palpitation, edema, dyspnea, cough, fever, weakness and fatigue, nausea and vomiting, vertigo, hiccups, unconsciousness, convulsions, muscle spasm, menstrual and urinary disorders, and jaundice.

—GEORGE M. POWELL, Col., MC, USA

TEXTBOOK OF PHARMACEUTICAL COMPOUNDING AND DISPENSING, edited by *Rufus A. Lyman, M. D., and Joseph B. Sprowls, Ph. D.* Consulting Editor, *George Urdang, Ph. G., D. Sc. Nat., Sc. D. (h. c.).* 2d edition. 477 pages; illustrated. J. B. Lippincott Co., Philadelphia, Pa., 1955. Price \$9.75.

The second edition follows the lead of the first in attempting to place the "making up" and "dealing out" of medicinal products on a sound scientific foundation. This text attempts to avoid the presentation of compounding and dispensing as a course in technique and applies physical chemical principles to the preparation of prescriptions.

Each chapter is written by an expert in the field covered, yet the integration of material has been accomplished in a masterly fashion. The chapters are followed by an up-to-date reference section which should prove useful to the reader who requires more background information on the subject at hand.

The text covers the full range of subjects involved in compounding, manufacturing, and dispensing of drugs, including chapters on dental prescriptions and hospital pharmacy, and has been brought up to date to include the newer drugs. Reference tables on solubility, incompat-

ibilities, and isotonic equivalency appear in this text and should be of value not only to the student but to the practicing pharmacist.

A review of this textbook would be incomplete without mention of the interesting sections on the history of dispensing, the legal aspects of pharmacy, and prescription procedure.

This book may be recommended to the teaching profession as an excellent text, to the practicing pharmacist as a valuable reference source, and to the physician interested in the art of extemporaneous prescribing.—ROY L. MUNDY, *Capt., MSC, USA*

MEDICAL SUPPORT OF THE ARMY AIR FORCES IN WORLD WAR II, by *Mae Mills Link* and *Hubert A. Coleman*. 1,027 pages; illustrated. Office of the Surgeon General, Department of the Air Force, Washington, D. C., 1955. For sale by the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C. Price \$7.

The purpose and value of this extensive and interesting documentation of the medical support of the Army Air Forces (AAF) in World War II are summarized in the statement, in the foreword, of General of the Army Henry H. Arnold, Commanding General of the Army Air Forces: "The problems we have overcome in this war will not differ from possible problems of the future. The solutions will come from the things we have learned in this war. There will be nothing new facing us that has not already been answered in principle if not in practice."

Those who compiled this masterpiece of military medical history have performed an admirable task in reducing to very interesting reading a mass of statistical and historical data. The requirements of both the casual reader and the serious practitioner of aviation medicine are simultaneously met. Although the bulk of the work concerns itself with the medical service of the AAF during World War II, proper perspective is maintained in the well-constructed preface and postscript. It is essentially the story of Major General David N. W. Grant, the Air Surgeon, and all those who have preceded and succeeded him.

The central theme of the volume is the support of the combat mission of the Army Air Forces, therefore emphasis is appropriately placed on the background and reasons for major policy decisions at Headquarters, AAF. The book portrays in detail the operational medical problems encountered by the AAF and the measures used to solve them. Certain specialized clinical programs are adequately indexed but excluded from the text of the volume.

The work is exceptionally well organized; its table of contents accurately portrays the subject matter of each chapter; and comprehensive reference material follows each chapter. This book is an excellent example of balance between readability and detail, and is highly recommended for practitioners of aviation medicine and those who merely wish to learn more of its past accomplishments and its promises for the present and future.—SPURGEON H. NEEL, Jr., *Lt Col., MC, USA*

THE YEAR BOOK OF RADIOLOGY (1955-1956 Year Book Series). Part I: Radiologic Diagnosis, edited by John Floyd Holt, M. D., and Fred Jenner Hodges, M. D. Part II: Radiation Therapy, edited by Harold W. Jacox, M. D., and Morton M. Kligerman, M. D. 413 pages; illustrated. Year Book Publishers, Inc., Chicago, Ill., 1955. Price \$9.

The articles in this Year Book are abstracted from journals received between June 1954 and June 1955. Compliments are due the editors on the selection of material, the concise comprehensive language of the abstracts, and the direct manner of presentation. The illustrations are superior photographic reproductions showing the utmost in detail. Specific subjects may be promptly located by referring to the accurate and complete index.

This book will refresh the reader on articles he has read and direct his attention to material that may have escaped him. New developments in the broad field of radiology are emphasized in the introductions to the diagnostic and radiotherapy sections and allude to the new ideas and techniques to follow. Practically all fields of medical endeavor are touched on in this volume, and regardless of the physician's specialty much of this book will prove to be of great interest. The frank comments of the editors, men of wide experience, enhance the reader's appreciation and evaluation of the material presented.

A comparison of this Year Book of Radiology with those of former years convinces the reviewer that a high standard of excellence has been set and maintained from the inception of this series to the present publication.—ALLAN B. RAMSAY, Col., MC, USA

PUBLIC HEALTH, Its Promise for the Future, A Chronicle of the Development of Public Health in the United States, 1607-1914, by Wilson G. Smillie, M. D., D. P. H., Sc. D. (Hon.). 501 pages; illustrated. The Macmillan Co., New York, N. Y., 1955.

The author's statement to the contrary notwithstanding, this is a history—and a very interesting and much-needed one—of the development of public health in the United States during the period 1607-1914. It is not, however, a detailed chronology but a searching appraisal of persons and events in public health as manifestations of the social growth and development of our nation.

Written by a great public health teacher and practitioner in the maturity of years and experience, this volume will be welcomed by all students of the American system. The author himself has aptly expressed the most important contribution of his work: "The historical perspective gives a student of this field a very firm foundation on which to stand. He learns from the mistakes that others have made. He becomes more tolerant and more patient. He is less insistent on getting things done—at once. All social development is a very slow and gradual process."

It is to be hoped that Doctor Smillie will reconsider his decision and continue this vital and important story.

—JAMES H. GORDON, Col., MC, USA

**POLIOMYELITIS**, Papers and Discussions Presented at the Third International Poliomyelitis Conference, compiled and edited for the International Poliomyelitis Congress. 567 pages; illustrated. J. B. Lippincott Co., Philadelphia, Pa., 1955. Price \$7.50.

This book is a report of the scientific progress of the medical and allied sciences throughout the world on the efforts being put forth to combat poliomyelitis. It is an excellent compilation and organization of a mass of medical information delivered by investigators from many countries and translated from the original language into English.

Every section of this book is interesting because of its contribution to the fight against poliomyelitis; however, the section on "Infection and Immunity in Poliomyelitis" is the most interesting, particularly the papers on "Studies with Noninfectious Poliomyelitis Virus Vaccines" by Doctor Jonas E. Salk and "Avirulent Viruses for Immunization against Poliomyelitis" by Doctor Albert E. Sabin.

The charts, graphs, and tables shown with these presentations give a definite picture of the trend in which preventive medicine investigators are working to eliminate this disease, and it must have been very satisfying to those who listened to these speakers to learn a few months later that the vaccines spoken of at this conference were later successful in field trials in the United States.

Included in this publication for the first time is an address by His Holiness, Pope Pius XII and also the banquet addresses of the representative from the Western Hemisphere, Europe, and the Eastern Hemisphere.

This printing of the Proceedings of the Third International Poliomyelitis Conference in a single volume has produced a reference on poliomyelitis that can be used by all members of the medical and allied fields.

For public health and preventive medicine officers, this book should be a "must" on their current reading lists.

—JOHN F. HARRIS, Lt. Col., MC, USA

**ACCEPTED DENTAL REMEDIES 1956**, revised by Council on Dental Therapeutics of the *American Dental Association*. 21st edition. 206 pages. American Dental Association, Chicago, Ill., 1956. Price \$2.

This book, published annually, "is designed to be both a listing of commercial products which are currently accepted (classified in Group A) by the Council and also a description of nearly all of the official and nonofficial therapeutic items which are of demonstrated usefulness in dental practice."

The opening chapters explain the provisions for acceptance by the Council. Official agencies and standards relating to drug products are listed, and the principles of prescription writing are briefly discussed. These are followed by chapters dealing with related therapeutic items by consideration of these items as a group and individually.



The final chapters contain formulas and tables of weights and measures, a discussion of the symptoms and treatment of acute poisoning, a bibliographic index to products not included in *Accepted Dental Remedies*, an index to other current Council reports, and an index to distributors.

This book, as an easy-to-use, well-indexed, concise, authoritative, and current source of information on the constantly changing status of dental products, is invaluable to every practicing dentist.

—DONALD B. LENKERD, Col., USAF (DC)

THE AMERICAN DRUG INDEX, by Charles O. Wilson, Ph. D., and Tony Everett Jones, M. S. 376 pages. J. B. Lippincott Co., Philadelphia, Pa., 1956. Price \$5.

The *American Drug Index* is a well-organized work, presenting a more complete list of pharmaceuticals than any former publication of this kind. The preparations are listed alphabetically, with helpful cross-indexing, under generic names, chemical names, brand, trade, or specialty names, and synonyms in general use. Data given include generic name, chemical name or composition, manufacturer, pharmaceutical forms, size, dosage, use, and recognition by U. S. P., N. F., N. N. R., and A. D. R. If the same therapeutic agent or combination of therapeutic agents is on the market under many specialty names, these names are also listed under the generic name, with pertinent details. The cross-indexing makes it easy to find drugs or drug combinations when only one major ingredient is known.

Such a book is almost a necessity to anyone interested in keeping up-to-date on pharmaceutical preparations. New drugs, in many combinations and under many trade names, have been introduced in great numbers during recent months, so no older publication covers the field adequately. The *American Drug Index* is recommended to physicians, pharmacists, dentists, nurses, sales representatives of pharmaceutical houses, and teachers and students in pharmacy schools.

—RUSSELL L. TAYLOR, Comdr., MSC, USN

THE DYNAMIC EQUILIBRIUM OF BODY PROTEINS, Hemoglobin, Plasma Proteins, Organ and Tissue Proteins, by George H. Whipple, M. D. 68 pages; illustrated. Charles C Thomas, Publisher, Springfield, Ill., 1956. Price \$3.25.

This monograph consists of 64 pages and can easily be read within an hour. Throughout the book the interchange of proteins from the plasma to the other organs and structures of the body, and the physiology of protein metabolism according to the experimental investigations done by this author and others is repeatedly pointed out. All of the experimental work was done on dogs and the conclusion drawn from many of the experiments is shown in 24 diagrams and graphs.

The monograph is a concise and easily readable presentation for those interested in the field of body protein balance.

—RUSSELL H. WALKER, Capt., MC, USN



- A MANUAL OF PHYSICAL EDUCATION ACTIVITIES, by *Hollis F. Fast, John H. Shaw, Grace I. Fox, and Cecil B. Hollingsworth*. 310 pages; illustrated by *Robert J. Demarest*. W. B. Saunders Co., Philadelphia, Pa., 1956. Price \$4.
- DEVELOPMENT OF VERTEBRATES, by *Emil Writschl*. 588 pages; illustrated. W. B. Saunders Co., Philadelphia, Pa., 1956. Price \$8.
- A TEXTBOOK OF OPERATIVE DENTISTRY, by *William H. O. McGehee, D. D. S., M. D., F. A. C. D.; Harry A. True, D. D. S., F. A. C. D.; and E. Frank Inskip, B. S., D. D. S., F. A. C. D.* 4th edition. 720 pages; illustrated. The Blakiston Division, McGraw-Hill Book Co., Inc., New York, N. Y., 1956. Price \$14.
- VIRUS DISEASES AND THE CARDIOVASCULAR SYSTEM, A Survey, by *Ernest Lyon, M. D.* 215 pages. Grune & Stratton, Inc., New York, N. Y., 1956. Price \$5.75.
- YEAR BOOK OF DERMATOLOGY AND SYPHILOLOGY (1955-1956 Series), by *Rudolf L. Baer, M. D., and Victor H. Witten, M. D.* 480 pages; illustrated. The Year Book Publishers, Inc., Chicago, Ill., 1956. Price \$6.50.
- THE MORPHOLOGY OF HUMAN BLOOD CELLS, by *L. W. Diggs, M. D.; Dorothy Sturm, Instructor, Memphis Academy of Arts; and Ann Bell, B. A.* 181 pages; illustrated. W. B. Saunders Co., Philadelphia, Pa., 1956. Price \$12.
- QUANTITATIVE CHEMICAL ANALYSIS—A Basic Course in the Theory and Practice, by *Robert B. Fischer, Ph. D.* 401 pages; illustrated. W. B. Saunders Co., Philadelphia, Pa., 1956. Price \$5.50.
- BOTANY, by *Paul Weatherwax, Professor of Botany, Indiana University*. 3d edition. 509 pages; illustrated. W. B. Saunders Co., Philadelphia, Pa., 1956. Price \$5.75.
- PHYSICAL DIAGNOSIS, by *Ralph H. Major, M. D., and Mahlon H. Delp, M. D.* 5th edition. 358 pages; illustrated. W. B. Saunders Co., Philadelphia, Pa., 1956. Price \$7.
- HEALTH INSURANCE—WHAT ARE THE ISSUES? by the *Canadian Welfare Council*. An objective statement of differing views with a guide for discussion purposes. 60 pages. Publications Department, Canadian Welfare Council, Ottawa 3, Ontario, Canada, 1956. Price \$1.
- INFANT METABOLISM, Proceedings of the World Health Organization's Seminars Held at Leyden and Stockholm in October-November, 1950, conducted by *Evert Gorter, S. Z. Levine, and Arvid Wallgren*. Edited by *I. Herbert Scheinberg*. 435 pages; illustrated. The Macmillan Co., New York, N. Y., 1956.
- THE MENTALLY RETARDED PATIENT, by *Harold Michal-Smith, Ph. D.* 203 pages. J. B. Lippincott Co., Philadelphia, Pa., 1956. Price \$4.
- HUMAN OVULATION AND FERTILITY, by *Edmond J. Farns, Ph. D.* 159 pages; illustrated. J. B. Lippincott Co., Philadelphia, Pa., 1956. Price \$6.50.
- TEXTBOOK OF ORGANIC MEDICINAL AND PHARMACEUTICAL CHEMISTRY, edited by *Charles O. Wilson, Ph. D., and Ole Grsvold, Ph. D.* 3d edition. 823 pages; illustrated. J. B. Lippincott Co., Philadelphia, Pa., 1956. Price \$11.
- TREATMENT OF THE CHILD IN EMOTIONAL CONFLICT, by *Hyman S. Lippman, M. D.* 298 pages. The Blakiston Div., McGraw-Hill Book Co., Inc., New York, N. Y., 1956. Price \$6.

- MEDICINAL CHEMISTRY, Volume II, A Series of Reviews Prepared under the Auspices of the Division of Medicinal Chemistry of the American Chemical Society, by seven authors. Edited by F. F. Blicke and C. M. Suter. 311 pages; illustrated. John Wiley & Sons, Inc., New York, N. Y., 1956. Price \$10.
- HISTORY OF NURSING NOTEBOOK, by Elizabeth M. Jamieson, B. A., R. N., and Mary F. Sewall, B. S., R. N. 10th edition. 80 pages. J. B. Lippincott Co., Philadelphia, Pa., 1956. Price \$3.25.
- A MANUAL OF ORAL SURGERY, A Step-by-Step Atlas of Operative Techniques, by W. Harry Archer, M. A., D. D. S. 2d edition. W. B. Saunders Co., Philadelphia, Pa., 1956.
- CARDIAC PRESSURES AND PULSES, A Manual of Right and Left Heart Catheterization, by Aldo A. Luisada, M. D., and Chi Kong Liu, M. D. 116 pages; illustrated. Grune & Stratton, Inc., New York, N. Y., 1956. Price \$6.
- HUMAN PERSPIRATION, by Yas Kuno, M. D. American Lecture Series, Publication No. 285, A Monograph in The Bannerstone Division of American Lectures in Physiology, edited by Robert F. Pitts, M. D., Ph. D. 416 pages; illustrated. Charles C Thomas, Publisher, Springfield, Ill., 1956. Price \$9.50.
- COMPLETE MOUTH REHABILITATION THROUGH CROWN AND BRIDGE PROSTHODONTICS, by Harry Kazis, D. M. D., and Albert J. Kazis, D. M. D. 392 pages; 551 illustrations on 332 engravings. Lea & Febiger, Philadelphia, Pa., 1956. Price \$15.
- ADVANCES IN INTERNAL MEDICINE, Volume VIII, edited by William Dock, M. D., and I. Snapper, M. D. 366 pages; illustrated. The Year Book Publishers, Inc., Chicago, Ill., 1956. Price \$9.
- ORAL CANCER AND TUMORS OF THE JAWS, by George S. Sharp, M. D.; Weldon K. Bullock, M. D., M. Sc. (Path.); and John W. Hazlet, D. D. S. 560 pages; illustrated. The Blakiston Div., McGraw-Hill Book Co., New York, N. Y., 1956. Price \$15.
- PROCEEDINGS OF THE ROUND TABLE ON LYSERGIC ACID DIETHYLAMIDE AND MESCALINE IN EXPERIMENTAL PSYCHIATRY, Held at the Annual Meeting of the American Psychiatric Association, Atlantic City, N. J., 12 May 1955. Edited by Louis Cholden, M. D., Chairman. 85 pages; illustrated. Grune & Stratton, Inc., New York, N. Y., 1956. Price \$3.
- A NEW PSYCHOTHERAPY IN SCHIZOPHRENIA, Relief of Frustrations by Symbolic Realization, by Marguerite Secchey, translated by Grace Rubin-Rabson, Ph. D. 199 pages. Grune & Stratton, Inc., New York, N. Y., 1956. Price \$4.50.
- COLLECTED PAPERS OF THE MAYO CLINIC AND THE MAYO FOUNDATION, edited by Richard M. Hewitt, M. A., M. D.; John R. Miner, Sc. D.; James R. Eckman, M. A., Ph. D.; M. Katharine Smith, B. A.; Carl M. Gambill, M. D., M. P. H.; Florence Schmidt, B. S. E.; and George G. Stilwell, M. D. Volume XLVII, 1955. 791 pages; illustrated. W. B. Saunders Co., Philadelphia, Pa., 1956.
- ENDOGENOUS UVEITIS, by Alan C. Woods, M. D., with illustrations by Annette Smith Burgess. 303 pages; illustrated. The Williams & Wilkins Co., Baltimore, Md., 1956. Price \$12.50.
- TREATMENT OF HEART DISEASE, A Clinical Physiologic Approach, by Harry Gross, M. D., and Abraham Jezer, M. D. 549 pages; illustrated. W. B. Saunders Co., Philadelphia, Pa., 1956.

- THE LUNG AS A MIRROR OF SYSTEMIC DISEASE**, by *Eli H. Rubin*, M. D. 288 pages; illustrated. Charles C Thomas, Publisher, Springfield, Ill., 1956. Price \$12.50.
- THE NEUROSURGICAL ALLEVIATION OF PARKINSONISM**, by *Ireing S. Cooper*, M. D., Ph. D., F. A. C. S. 104 pages; illustrated. Charles C Thomas, Publisher, Springfield, Ill., 1956. Price \$8.50.
- CLINICAL SELECTIONS IN DERMATOLOGY AND MYCOLOGY**, by *Frederick Rehm Schmidt*, M. D., with contributions by 36 specialists from various lands. 505 pages. Charles C Thomas, Publisher, Springfield, Ill., 1956. Price \$10.50.
- BIOCHEMISTRY OF THE EYE**, by *Antoinette Pirie*, M. A., Ph. D., and *Ruth Van Heyningen*, M. A., D. Phil. 323 pages; illustrated. Charles C Thomas, Publisher, Springfield, Ill., 1956. Price \$7.
- PROGRESS IN PSYCHOTHERAPY, 1956**, edited by *Frieda Fromm-Reichmann*, M. D., and *J. L. Moreno*, M. D. 352 pages. Grune & Stratton, Inc., New York, N. Y., 1956. Price \$8.50.
- CLINICAL HEMATOLOGY**, by *Maxwell M. Wintrobe*, M. D., Ph. D. 4th edition. 1,184 pages; 236 illustrations and 20 plates, 18 in color. Lea & Febiger, Philadelphia, Pa., 1956. Price \$15.
- A TEXTBOOK OF PATHOLOGY**, by *E. T. Bell*, M. D. Contributors: *B. J. Clawson*, M. D., and *J. S. McCartney*, M. D. 8th edition. 1,028 pages; 545 illustrations and 5 plates in color. Lea & Febiger, Philadelphia, Pa., 1956. Price \$14.50.
- THE RECOVERY ROOM, Immediate Postoperative Management**, by *Max S. Sadove*, M. D., and *James H. Cross*, M. D., with contributions by 24 authorities. 597 pages; illustrated. W. B. Saunders Co., Philadelphia, Pa., 1956.
- PATTERNS OF MOTHERING, Maternal Influence During Infancy**, by *Sylvia Brody*, Ph. D. Introduction by *Rene A. Spitz*, M. D. 446 pages. International Universities Press, Inc., New York, N. Y., 1956. Price \$7.50.
- ELECTRODIAGNOSIS AND ELECTROMYOGRAPHY**, edited by *Sidney Licht*, M. D. Volume One of Physical Medicine Library. 272 pages; 90 figures. Elizabeth Licht, Publishers, New Haven, Conn., 1956. Price \$10.
- MORAL HANDBOOK OF NURSING, A Compendium of Principles, Spiritual Aids, and Concise Answers regarding Catholic Personnel, Patients, and Problems**, by Reverend *Edward J. Hayes*, Reverend *Paul J. Hayes*, and *Dorothy Ellen Kelly*, R. N. Chief Moral Consultant: Very Reverend *Francis J. Connell*, C. SS. R., S. T. D., LL. D. Chief Medical Consultants: *Samuel A. Cosgrove*, M. D., F. A. C. S., and *Robert Cosgrove*, M. D., F. A. C. S. 180 pages. The Macmillan Co., New York, N. Y., 1956.
- BLAKISTON'S NEW GOULD MEDICAL DICTIONARY**, A modern comprehensive dictionary of the terms used in all branches of medicine and allied sciences, including medical physics and chemistry, dentistry, pharmacy, nursing, veterinary medicine, zoology and botany, as well as medico-legal terms, edited by *Normand L. Hoerr*, M. D., and *Arthur Osol*, Ph. D., with the cooperation of an editorial board and 88 contributors. 2d edition. 1,463 pages, 252 illustrations on 45 plates, 129 in color. The Blakiston Division, McGraw-Hill Book Co., Inc., New York, N. Y., 1956. Price \$11.50.

# UNITED STATES ARMED FORCES MEDICAL JOURNAL

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*Editor*

CAPTAIN BENNETT F. AVERY, MC, USN

*Associate Editors*

COLONEL ROBERT S. ANDERSON, MC, USA

LIEUTENANT COLONEL PAUL V. DAVIS, USAF (MC)

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WASHINGTON : 1956

# Monthly Message

This month and next I am quoting paragraphs from significant addresses of two of our most famous Presidents. Although written many years ago, they are as pertinent today as they were when written. In this number, I invite your attention particularly to the second of two paragraphs from Washington's Farewell Address. These words of advice should afford much deep thought on the part of all of us today.

The Unity of Government which constitutes you one people is also now dear to you. It is justly so; for it is a main Pillar in the Edifice of your real independence, the support of your tranquillity at home; your peace abroad; of your safety; of your prosperity; of that very Liberty which you so highly prize. But as it is easy to foresee, that from different causes and from different quarters, much pains will be taken, many artifices employed, to weaken in your minds the conviction of this truth; as this is the point in your political fortress against which the batteries of internal and external enemies will be most constantly and actively (though often covertly and insidiously) directed, it is of infinite moment that you should properly estimate the immense value of your national Union to your collective and individual happiness; that you should cherish a cordial, habitual and immovable attachment to it; accustoming yourselves to think and speak of it as of the Palladium of your political safety and prosperity; watching for its preservation with jealous anxiety; discountenancing whatever may suggest even a suspicion that it can in any event be abandoned, and indignantly frowning upon the first dawning of every attempt to alienate any portion of our Country from the rest, or to enfeeble the sacred ties which now link together the various parts.

\* \* \*

In the execution of such a plan nothing is more essential than that permanent, inveterate antipathies against particular Nations and passionate attachments for others should be excluded; and that in place of them just and amicable feelings towards all should be cultivated. The Nation, which indulges towards another an habitual hatred, or an habitual fondness, is in some degree a slave. It is a slave to its animosity or to its affection, either of which is sufficient to lead it astray from its duty and its interest. Antipathy in one Nation against another, disposes each more readily to offer insult and injury, to lay hold of slight causes of umbrage, and to be haughty and intractable, when accidental or trifling occasions of dispute occur. . . .

*Frank B. Berry*

FRANK B. BERRY, M. D.

Assistant Secretary of Defense  
(Health and Medical)

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## Foreword

The *United States Armed Forces Medical Journal* is the medium for disseminating information of administrative and professional interest to all medical personnel of the Department of Defense. The Assistant Secretary of Defense (Health and Medical) and the Surgeons General of the several services invite all medical officers, dental officers, Medical Service Corps officers, Nurse Corps officers, and officers of the Veterinary Corps of the Armed Forces, and the medical consultants of the Army, Navy, and Air Force to submit manuscripts for publication in this journal.

FRANK B. BERRY, M. D.,  
*Assistant Secretary of Defense (Health and Medical).*

MAJOR GENERAL SILAS B. HAYS,  
*Surgeon General, United States Army.*

REAR ADMIRAL BARTHOLOMEW W. HOGAN,  
*Surgeon General, United States Navy.*

MAJOR GENERAL DAN C. OGLE,  
*Surgeon General, United States Air Force.*

# UNITED STATES ARMED FORCES MEDICAL JOURNAL

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## THE SAFE-DRIVER INVENTORY

### A Test for Selecting the Safe Automobile Driver

FREDERICK L. MCGUIRE, *Lieutenant, MSC, USN*

**T**HE SAFE-DRIVER Inventory (see Form A in Appendix) is a pencil and paper test designed for use in selecting the safe automobile driver. It is composed of 89 items and may be administered to groups or individuals.

#### SELECTION OF TEST ITEMS

In order to find valid test items, a number of existing test and original items were used.<sup>1</sup> The 446 people tested received a maximum of seven hours' psychometric testing as well as a personal interview. Two groups of individuals were studied. One group consisted of persons who had had at least one accident within recent months in which they had also incurred a moving traffic violation. The other group consisted of persons who had neither been involved in any kind of accident nor incurred a traffic violation of any type throughout their driving careers.

Those tested were examined on each of three successive days. The first day they received the Minnesota Multiphasic Personality Inventory and were interviewed if time allowed. The second day they were given the Army General Classification Test (GCT) (civilian version), the Kuder Preference Record (personal form), and the Bell Adjustment Inventory, and were interviewed if this had not been done the first day. On the third day the subjects were given a questionnaire composed of 212 miscellaneous attitude items, the Rosenzweig Picture Frustration Study,<sup>2</sup> and a sentence completion test.\*

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From Naval Medical Field Research Laboratory, Camp Lejeune, N. C. Lt. McGuire is now assigned to U. S. Naval Hospital, Philadelphia, Pa.

Acknowledgement is given to Sgt. Donald D. Hergenreder, USMC, for his skilled assistance in gathering and processing these data.

\*The results of the sentence-completion test were not used in this study.

The attitude items used were gathered from many sources. Thurstone's scales for measuring "Attitude Toward Law," Forms A and B (prepared by Daniel Katz), were included intact, as was the scale, "Attitude Toward War" (prepared by Ruth C. Peterson). Selected items were taken from a list of words and phrases published by Donald W. Conover and from the Siebrecht Attitude Scale (attitude toward driving). A number of original items were also placed in this list.

The interview was based on 15 items. The first 11 items were: name, rank, serial number, local address, whether the person was drafted or volunteered, length of military service, age, marital status, number of children, highest grade completed in school, and number of years of experience driving on state highways. The last four items asked for an estimate of miles driven within the last year, an estimate of miles driven the year before that, and approximate dates of all previous accidents and traffic violations.

The first 11 items were asked routinely, but the interview was conducted in a more permissive manner concerning the other items in order to arrive at the most nearly correct answers. The subject was assured that what he said would be held in strictest confidence. It was explained to him that full information concerning his driving experience was needed only for the purposes of the present study. Similar assurance was given to all groups before the testing sessions were begun.

In addition to these factors, intelligence test scores (as derived by GCT score) were considered. These scores were merely compared statistically on a group basis. The respective means were 108.7 and 109.2, with standard deviations of 17.6 and 14.8. The significance of difference between the means is represented by a critical ratio (c.r.) of 0.1947, which is not significant.

From the 446 subjects tested, 67 accident- and violation-free drivers were matched with 67 drivers, each of whom had had an accident in recent months and had incurred a moving violation at the same time. The basis of selection of these groups is shown in tables 1 and 2.

An item analysis was performed on all items from the tests referred to above. Those test items that differentiated between the two groups to at least the 5 per cent level of confidence were selected to comprise the Safe-Driver (S-D) Inventory.

#### ADMINISTRATION OF THE S-D INVENTORY

The S-D Inventory (Form A) consists of five parts with a separate set of instructions for each part. The tester reads aloud

TABLE 1. *Characteristics of accident and accident-free, violation-free groups*

<i>Driving experience in years</i>	<i>A-V free</i>	<i>A</i>
0-2.9	6	6
3-5.9	17	18
6-7.9	22	22
8-9.9	11	11
10 and over	11	10
<i>Age</i>		
18-21	15	15
22-25	44	44
26-30	4	4
31-40	4	4
<i>Marital status</i>		
Single	39	39
Married, no children	18	18
Married with children	10	10
<i>Two-year mileage</i>		
0-5,000	9	9
5,001-10,000	9	9
10,001-15,000	7	7
15,001-20,000	7	7
20,001-30,000	16	16
30,001-40,000	4	4
40,001-50,000	5	5
50,001 and over	10	10
<i>Education</i>		
Grades 4-8	12	14
Grades 9-12	47	47
Grades 13-16	8	6
<i>Years in service</i>		
0-1.9	22	22
2-4.9	30	30
5 and over	15	15

TABLE 2. *Accident-violation record of accident group (lifetime)*

<i>Accidents (with and without violations*)</i>	<i>Violations* (without accidents)</i>				
	0	1	2	3	6
1 (with)	9	18	2	1	1
2 (with)	3	5	—	1	—
2 (1 with; 1 without)	8	1	5	3	—
3 (1 with; 2 without)	3	1	—	—	—
3 (2 with; 1 without)	—	1	2	—	—
3 (with)	1	1	—	—	—
5 (3 with; 2 without)	—	1	—	—	—

\*All violations listed are moving violations.

the directions for the whole Inventory. He then reads aloud the instructions for part 1. When testees have finished part 1, he reads aloud the instructions for part 2. This process is repeated for all five parts.

There is no time limit, but when administered to a group, the time seldom exceeds 45 minutes.

### SCORING OF THE S-D INVENTORY

The test is scored by obtaining the algebraic sum of the plus and minus responses. Those responses which are like those of the accident- and violation-free normative group are scored plus; those that are like those of the accident-violation group are scored minus.

The score is then converted in order to eliminate minus scores. If the algebraic sum is zero, the converted score is 100. If the algebraic sum is plus, it is merely added to 100 in order to obtain the converted score. If the algebraic sum is minus, it is subtracted from 100. For example, an algebraic sum of minus 5 is converted to a score of 95; a sum of plus 5 becomes 105.

### VALIDITY

Because the Inventory is designed to differentiate the dichotomy of "accident-free" and "accident-involved," the validity of the test cannot be indicated by the usual statistics (*i.e.*, Pearson product moment correlation). The biserial correlation, which could be used with the Inventory data, does not enter into prediction formulas nor lead to an error of estimate. Its interpretation is also open to some question. Therefore, the test scores are presented herein in terms of "efficiency of prediction."

When used on the original two groups (tables 1 and 2), the Inventory produced an efficiency of prediction of 88 per cent. That is, the test scores correctly labeled 88 per cent of the individuals according to the group in which they belonged.

As a cross-validation two new groups were selected and administered the Inventory. There were 57 Marine Corps personnel in each group. They were equated according to years of driving experience, age, mileage, and marital status (table 3). When used on these two groups, the Inventory produced an efficiency of prediction of 65 per cent. The significance of difference between the means was equal to a critical ratio of 4.4053.

As a further check, two other groups of drivers were administered the Inventory. At the time of the test they were asked to write down their accident and violation history. There was no attempt either to determine by interview the validity of their statements or to match the groups. One group of 74 men professed to have had at least one recent accident in which they

had incurred a moving violation. The other group of 130 men professed never to have had an accident or incurred a traffic violation of any type during their driving history. When used on these groups, the Inventory produced an efficiency of prediction of 61 per cent. The difference between the two group means was equal to a critical ratio of 3.8432.

TABLE 3. *Characteristics of cross-validation groups*

Characteristic	Groups	
	Accident	Accident-free
<i>Estimated 2-year mileage</i>		
0 to 5,000	5	5
5,001 to 10,000	13	13
10,001 to 15,000	8	8
15,001 to 20,000	7	7
20,001 to 25,000	5	5
25,001 to 30,000	4	4
30,001 to 40,000	6	7
40,001 to 50,000	4	3
50,001 and over	5	5
<i>Age</i>		
17 to 20	33	33
21 to 25	17	17
26 to 30	3	4
31 to 40	4	3
<i>Years' driving experience</i>		
1 to 4.9	31	35
5 to 9.9	18	18
10 to 14.9	4	2
15 and over	4	2
<i>Marital status</i>		
Single	36	38
Married, no children	11	10
Married, with children	10	9

Finally, a single group of 60 Marine Corps personnel were administered the Inventory. These men all admitted to at least one recent accident in which they also incurred a violation. Their test scores successfully predicted their status 70 per cent of the time.

#### RELIABILITY

The coefficient of reliability for the S-D Inventory is 0.89. This was obtained by giving the test to an unselected sample of 227 marines, correlating the odd-even items, and using the Spearman-Brown prophecy formula.

## NORMS

The norms for the S-D Inventory are based on the cross-validation groups described in table 4. The parameters of these two groups are as follows: Accident group—a mean of 102.39 with a standard deviation of 13.31; accident-violation free group—a mean of 113.96 with a standard deviation of 14.48.

TABLE 4. *Accident record of the accident-involved cross-validation group*

Accidents (with and without violations*)	Violations* (without accidents)						
	0	1	2	3	4	5	6
1 (with)	15	9	3	—	—	—	—
2 (with)	1	2	—	—	—	—	—
2 (1 with; 1 without)	6	4	1	2	—	1	—
3 (1 with; 2 without)	—	1	—	—	—	1	2
3 (2 with; 1 without)	—	—	2	—	—	—	—
4 (1 with; 3 without)	2	—	—	—	—	—	—
4 (2 with; 2 without)	1	—	—	—	—	—	—
4 (3 with; 1 without)	—	—	—	—	1	—	—
5 (1 with, 4 without)	—	1	1	—	—	—	—
6 (with)	—	1	—	—	—	—	—

\*All violations listed are moving violations.

Table 5 outlines the efficiency of prediction for the Inventory for different cut-off scores. The maximum total efficiency is 64.00 per cent. However, by using different cut-off scores, the

TABLE 5. *Efficiency of prediction for S-D Inventory (Form A)*

Cut-off score's	Groups correctly predicted		
	Accident (per cent)	Accident-free (per cent)	Total (per cent)
102-103	48.80	77.64	63.22
103-104	51.99	75.49	63.74
104-105	64.78	73.24	69.01
105-106	57.93	70.88	64.41
106-107	60.64	68.44	64.54
107-108	63.68	65.91	64.80
108-109	66.28	63.31	64.80
109-110	69.15	60.64	64.90
110-111	71.57	57.93	64.75
111-112	74.22	55.57	64.90
112-113	76.42	52.79	64.61
113-114	78.81	50.00	64.41

Inventory may be used to raise the efficiency of prediction for one group or the other. This may be of practical value when it is desired to select the maximum number of one group and there is no need to be concerned over the lessened efficiency for predicting members of the other group. Table 3 may be expanded to include other cut-off scores by merely using the normal curve areas described by the above parameters.

Because every psychometric test contains a certain margin of error, it is important for a test administrator to know the margin of error involved in any given score. Table 6 tells how positive one can be that a given score correctly labels any particular testee.

TABLE 6. *Efficiency of prediction for any score on the S-D Inventory, Form A*

Score	Percent chance of belonging to either group		Score	Percent chance of belonging to either group	
	Accident-free	Accident		Accident-free	Accident
134 or above	99.1	0.9	102	48.8	51.2
133	98.9	1.1	101	46.0	54.0
132	98.7	1.3	100	42.9	57.1
131	98.4	1.6	99	40.1	59.9
130	98.0	2.0	98	37.1	62.9
129	97.7	2.3	97	34.5	65.5
128	97.3	2.7	96	31.6	68.4
127	96.8	3.2	95	29.1	70.9
126	96.2	3.8	94	26.4	73.6
125	95.5	4.5	93	23.9	76.1
124	94.7	5.3	92	21.8	78.2
123	93.9	6.1	91	19.5	80.5
122	92.9	7.1	90	17.7	82.3
121	91.9	8.1	89	15.6	84.4
120	90.7	9.3	88	14.0	86.0
119	89.4	10.6	87	12.3	87.7
118	87.9	12.1	86	10.9	89.1
117	86.4	13.6	85	9.5	90.5
116	84.6	15.4	84	8.4	91.6
115	82.9	17.1	83	7.2	92.8
114	80.8	19.2	82	6.3	93.7
113	78.8	21.2	81	5.4	94.6
112	76.4	23.6	80	4.6	95.4
111	74.2	25.8	79	3.9	96.1
110	71.6	28.4	78	3.4	96.6
109	69.2	30.8	77	2.8	97.2
108	66.3	33.7	76	2.4	97.6
107	63.7	36.3	75	2.0	98.0
106	60.6	39.4	74	1.7	98.3
105	57.9	42.1	73	1.4	98.6
104	54.8	45.2	72	1.1	99.9
103	52.0	48.0	71	0.9	99.1



If the S-D Inventory is to be used with Marine Corps personnel, the question arises as to whether the test was standardized on a sample that is representative of all marines. Therefore, the test scores of the 114 subjects who comprised the cross-validation were compared with the test scores of an unselected sample of 1,215 enlisted marines at Camp Lejeune (fig. 1).<sup>\*</sup> This latter sample was drawn from nearly every battalion-size unit at Camp Lejeune. Each unit was assigned a quota according to its current strength, and this number of men were presented for testing on an available basis.

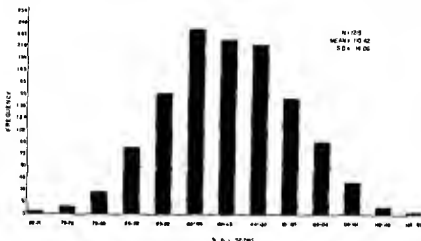


Figure 1. Safe-driver inventory scores, Form A, for 1,215 unselected subjects.

When submitted to chi-square analysis for goodness of fit, the result is a *P.* of 0.50. This means that the differences between the test score distributions of the normative groups and the unselected sample could be expected by chance alone at least 50 per cent of the time. Therefore, we cannot assume that the normative groups were drawn from a sample *not* representative of the enlisted population of Camp Lejeune.

#### INTERPRETATION

It is important to remember that Inventory scores result in only two categories—"safe" (*i. e.*, accident and violation free) and "other" (*i. e.*, accident and violation involved). A sufficiently high score may allow us to assume that a person has traits and attitudes similar to the accident- and violation-free driver. However, a low score on this test does not allow us to label a person as being "accident-prone." It may only be said that he has traits and attitudes similar to that part of the driving population that possesses an accident-violation record for which they may be held at least partially responsible.

<sup>\*</sup>Total enlisted population of Camp Lejeune is approximately 36,000.

The Inventory was designed to predict the safe driver rather than the "accident-prone" driver partly because of necessity. It is this author's belief that a group of persons may be accident repeaters for almost as many reasons as there are patterns of maladjustment, but that an accident-free group reflects a single pattern. Therefore, a group selected as an experimental group on the basis of a repeated accident record is likely to reflect closely the personality attributes of the population at large, especially when compared with a control group of low-accident cases. The theory of the Inventory is that the accident-free group is basically different from all other accident classifications.

### THE S-D INVENTORY: FORM B OR SHORT FORM

The Safe-Driver Inventory, Form B (short form), is composed of 35 true-false items and is designed to do the same task as Form A. Forms A and B correlate 0.85 (Pearson ratio), based on 114 subjects.

The items in Form B are the same as those items in part 1 of Form A. Form B is scored by the same method as Form A and is administered according to the instructions given for part 1 of Form A. There is no time limit, but when administered to groups, the time seldom exceeds 10 minutes.

### VALIDITY

When the two matched groups described in tables 3 and 4 were scored for their responses to Form B, the efficiency of prediction is 66 per cent. The critical ratio between the means was 5.0392.

Two other groups of drivers described earlier in this article were scored for their responses to Form B. At the time of the test they were asked to write down their accident and violation history; no interview was given. One group of 74 men professed to have had at least one recent accident in which they had also incurred a moving violation. The other group of 130 men professed never to have incurred an accident or violation of any type during their entire driving history. When used on these groups, Form B produced an efficiency of prediction of 60 per cent. The critical ratio between the means was 4.0495.

### RELIABILITY

The coefficient of reliability for the S-D Inventory, Form B, is 0.76. This was obtained by scoring the responses of 117 unselected marines to part 1 of Form A. Odd-even items were correlated and modified by the Spearman-Brown prophecy formula.

### NORMS

The norms for the S-D Inventory, Form B. (short form) are based on the following parameters: Accident group—a mean of 101.21

with a standard deviation of 7.62; accident-violation free group—a mean of 108.49 with a standard deviation of 7.67.

Form B is to be interpreted in the same way as Form A, using the information in tables 7 and 8 and in figure 2.

TABLE 7. *Efficiency of prediction of S-D Inventory, Form B (short form)*

Cut-off scores	Groups correctly predicted		
	Accident (per cent)	Accident-free (per cent)	Total (per cent)
101-102	48.80	80.23	64.52
102-103	53.98	76.42	65.20
103-104	59.10	72.24	65.67
104-105	64.43	67.72	66.08
105-106	69.15	62.93	66.04
106-107	73.57	57.53	65.55
107-108	77.64	52.39	65.02
108-109	81.33	47.21	64.27

TABLE 8. *Efficiency of prediction for any score on the S-D Inventory: Form B, (short form)*

Score	Percent chance of belonging to either group		Score	Percent chance of belonging to either group	
	Accident-free	Accident		Accident-free	Accident
119	99.0	1.0	100	43.6	56.4
118	98.6	1.4	99	38.6	61.4
117	98.1	1.9	98	33.7	66.3
116	97.4	2.6	97	29.1	70.9
115	96.5	3.5	96	24.8	75.2
114	95.4	4.6	95	20.9	79.1
113	93.9	6.1	94	17.1	82.9
112	92.2	7.8	93	14.0	86.0
111	90.0	10.0	92	11.3	88.7
110	87.5	12.5	91	9.0	91.0
109	84.6	15.4	90	7.1	92.9
108	81.3	18.7	89	5.5	94.5
107	77.6	22.4	88	4.2	95.8
106	73.6	26.4	87	3.1	96.9
105	69.2	30.8	86	2.3	97.7
104	64.4	35.6	85	1.7	98.3
103	59.5	40.5	84	1.2	98.8
102	54.0	46.0	83	0.8	99.2
101	48.8	51.2			

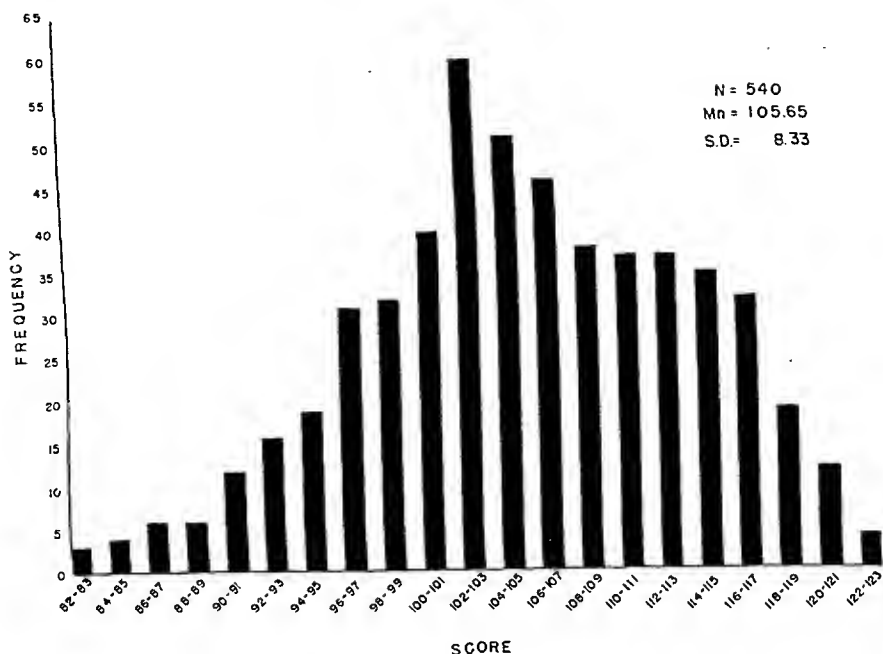


Figure 2. Safe-driver inventory scores, Form B, for 540 unselected subjects.

### SUMMARY

The Safe-Driver Inventory is a paper and pencil test designed as an aid in the selection of the safe automobile driver. The test items are of the personality type and were selected from a large number of items that differentiated between two groups of drivers to at least the 5 per cent level of confidence.

Form A is composed of 89 items, and Form B of 35. The two forms correlate 0.85 and produce reliability coefficients of 0.89 and 0.76, respectively. Both forms correctly predict the status of the members of a group about 65 per cent of the time. This prediction may be increased for one group if the resulting loss of predictive ability for the other group is not a problem.

The Inventory is based on the hypothesis that the accident-free driver provides a more suitable group for accident research than does the accident-repeater.

### REFERENCES

1. McGuire, F. L.: *Psychological Comparison of Accident-Violation Free and Accident-Incurring Automobile Drivers*. NM 005 052.33.04. Naval Medical Field Research Laboratory, Camp Lejeune, N. C., Feb. 1955.
2. McGuire, F. L.: Rosenzweig Picture Frustration Study for selecting safe drivers. *U. S. Armed Forces M. J.* 7: 200-207, Feb. 1956.

## APPENDIX

## The Safe-Driver Inventory\*

## Part I

This part consists of numbered statements. Read each statement and decide whether it is *true as applied to you* or *false as applied to you*.

You are to mark your answers in the circles. If a statement is *true* or *mostly true* as applied to you, mark the circle in the column headed T. If a statement is *false* or *not usually true* as applied to you, mark the circle in the column headed F. If a statement does not apply to you or if it is something that you don't know about, make no mark.

Remember to give your own opinion of yourself. Do not leave any blank spaces if you can avoid it. Try to make some answer to every statement.

## Part I of Form A

(also used as Form B)

1. My daily life is full of things that keep me interested.
2. I seldom worry about my health.
3. As a youngster I was suspended from school one or more times for cutting up.
4. I am a good mixer.
5. I have not lived the right kind of life.
6. I like poetry.
7. I think I would like the kind of work a forest ranger does.
8. I am easily downed in an argument.
9. I go to church almost every week.
10. I have very few quarrels with members of my family.
11. I believe women ought to have as much sexual freedom as men.
12. Someone has it in for me.
13. I believe in a life hereafter.
14. I enjoy a race or game better when I bet on it.
15. I know who is responsible for most of my troubles.
16. I like collecting flowers or growing house plants.
17. At times I feel like picking a fist fight with someone.
18. I have often lost out on things because I couldn't make up my mind soon enough.
19. It wouldn't make me nervous if any members of my family got into trouble with the law.
20. I liked school.
21. I have used alcohol excessively.

\*Instructions as printed here are condensed from those in the original test.

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22. I get mad easily and then get over it soon.
23. It is safer to trust nobody.
24. I am likely not to speak to people until they speak to me.
25. I have never been in trouble with the law.
26. In school I found it very hard to talk before the class.
27. At times I have very much wanted to leave home.
28. I am inclined to take things hard.
29. I do not like to see women smoke.
30. I like to attend lectures on serious subjects.
31. I would like to be an auto racer.
32. Christ performed miracles such as changing water into wine.
33. I pray several times every week.
34. I prefer work which requires close attention, to work which allows me to be careless.
35. I like to read about history.

### Part 2

This part is used for obtaining a record of your preferences. It is not a test. There are no right or wrong answers. An answer is right if it is true of you.

A number of activities are listed in groups of three activities in each group. Decide which of the three activities you like most, then decide which activity you like least, and make a mark in the appropriate circle.

Some of the activities involve preparation and training. In such cases, just suppose that you could first have the necessary training. Do not choose an activity merely because it is new or unusual. Choose what you would like to do if you were equally familiar with all of the activities.

In some cases you may like all three activities in a group. In other cases you may find all three activities unpleasant. Show what your first and last choices would be, however, if you *had* to choose. Some of the activities are imaginary. Some activities may seem trivial or foolish. Indicate your choices, anyway, for all of the groups.

36. A. Read about the jungles of Africa.  
B. Read various people's ideas of how to make a better world.  
C. Read about what various well-known people do in their spare time.
37. A. Read about more efficient methods of learning to do things.  
B. Read about interesting places in the United States.  
C. Read about new developments in airplanes.
38. A. Read about famous men and women in public life.  
B. Read various writers' descriptions of what an ideal world would be like.  
C. Read about the lives of the early pioneers of the country.

39. A. Tell a person just what you think of him even though it is unpleasant.  
B. Say something nice to a person even if you don't like what he has done.  
C. Not tell a person what you think if it is unpleasant.
40. A. Make arrangements for a banquet for a special occasion at a restaurant.  
B. Collect the money for the banquet from the people there.  
C. Attend the banquet with no special responsibility.
41. A. Entertain a group of friends with tricks of magic.  
B. Entertain a group of friends by playing a musical instrument.  
C. Watch someone else perform.
42. A. See movies of battle scenes.  
B. See movies of beautiful scenes in various countries.  
C. See movies of horse racing.
43. A. Be the warden of a prison.  
B. Be a college dean.  
C. *Be in charge of a school for feeble-minded children.*
44. A. Track down criminals.  
B. Be in charge of a prison.  
C. Conduct studies to find out the way criminals think.
45. A. Advise people concerning improving their personalities.  
B. Catch rare animals for a museum.  
C. Cash checks for people in a bank.
46. A. Be a college professor.  
B. Be in charge of students' social activities in a college.  
C. Be the business manager of a college.
47. A. Read a story laid in a fashionable winter resort.  
B. Read a story laid in an imaginary world.  
C. Read a story laid in a big city.
48. A. Teach children who are not very bright.  
B. Teach average children.  
C. Teach very bright children.
49. A. Read the funnies in a newspaper first.  
B. Read the news in a newspaper first.  
C. Read the editorials in a newspaper first.
50. A. Explore the site of an ancient city.  
B. Give lectures about ancient cities.  
C. Write articles about ancient cities.
51. A. Be an ambassador.  
B. Be a member of Congress.  
C. Be a government employee.





65. Have you had a number of experiences in appearing before public gatherings?

66. Have you been able to get the promotions you desire in your present job?

67. Are you often sorry for the things you do?

68. Would you like very much to move from the place where you now live so that you might have more personal independence?

69. Have you ever been seriously injured in any kind of an accident?

70. Would it be difficult for you to give an oral report before a group of people?

71. As a youth did you ever have a strong desire to run away from home?

#### Part 4

In the following part you will find a series of statements. You are to decide whether or not you agree with the statements. Decide whether you agree strongly, agree, are indifferent, disagree, or disagree strongly, then mark the appropriate circle.

72. Under some conditions, war is necessary to maintain justice.

73. The benefits of war rarely pay for its losses even for the victors.

74. Trailer trucks should be outlawed from the highway.

75. Driving a car is practically automatic—a good driver doesn't need to think about what he's doing.

76. Most accidents can't be helped.

77. The law does not benefit the common man.

78. How many accidents a guy has is more a matter of luck than of his driving ability.

#### Part 5

In the following part you will find a series of phrases or words. Look at each one, and decide if the phrase or word is *very pleasant* to you, if it is just *pleasant*, if you are *indifferent* to the phrase, if it is *unpleasant*, or *very unpleasant*. Mark your answers accordingly.

79. liquor party

80. beer tavern

81. hymn

82. nun

83. whisky

84. universities

85. dog race

86. socialism

87. side roads

88. scientific investigation

89. using tire chains in the mud

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More imagination with quiet thinking is needed.

—Martin T. Fischer

# ENURESIS

## Psychiatric Interview Studies

CHESTER M. PIERCE, *Lieutenant, MC, USNR*

HARRY H. LIPCON, *Captain, MC, USN*

JOSEPH H. McLARY, *Pb. B.*

HOWARD F. NOBLE, *Lieutenant, MSC, USN*

**A**S PART of a multifactorial investigation into the common problem of symptomatic immaturity habits, an attempt has been made to outline psychologic trends in 60 enuretic naval recruits as contrasted with 60 nonenuretic men, who had matriculated in the Electronics School. This report is a redaction of a heterogeneous mass of interview data in which an effort was made to extract only the lines of general personality direction, so that areas could be located for further theoretic and therapeutic research. In the spirit of disinterested inquiry, any effort of this sort must be criticized keenly, lest insignificant aspects of personality supersede factors of importance.

Superficially, the two groups studied represent the poles of psychologic suitability for the military, because the student group is deemed superior material and the enuretic group, by definition, is so inferior that they are forced into accepting discharge from the Navy. This unhappy circumstance obliged comparison between an experimental group and a homogeneous rather than a random control group. As a result of this disparity the socioeconomic backgrounds were adversely biased to the disfavor of the enuretics. Besides an inherent socioeconomic advantage, the controls were predominantly easterners (the Electronics School receives men according to qualifications from the entire fleet, while the recruits at this naval training center come from the midwestern and southern states); all were Caucasians, and they were slightly older than the recruits by an average of 1.6 years (19.2::17.6 years).

Transference and countertransference problems were similar in interviewing both groups. The examiner was the agent of inconvenience for the subjects and symbolized an authority who could command that the subjects be on call for interviews, physical examinations, electroencephalograms, projective tests, and

laboratory procedures. Many of the students were chagrined when delayed in classroom progress, inasmuch as such delay increased the strain under which they labored in order to complete their school courses. The enuretics were piqued because their presentation to an Aptitude Board which recommended their discharge from the service was delayed. Many of the men in both groups were apprehensive in regard to the prospective electroencephalographic testing and other procedures.

Despite these seemingly insuperable barriers it is believed that rapport was not damaged severely, and the chief limitation to the study, exclusive of the sampling error, was that in the short interview the men showed varying perspicacity and varying willingness to discuss certain topics. Nevertheless, from the subjective opinions of each man, we were able to visualize some characteristics of the enuretic, which previously had not been emphasized in the medical literature. Most of the voluminous literature on enuretics concerns the child enuretic. This article is a consideration of the problem of enuresis in males persisting through adolescence.

### PROCEDURE

In all cases the subject was seen in a clinical summation interview for about 35 minutes by the same medical officer (C. M. P.). The interview was structured and demanded many direct questions in order to obtain cursory, uniform material on each person. The individual's appearance, mood, and speech were observed. He was interrogated concerning life goals, hobbies, neuropathic traits, psychogenetic dynamics, interpersonal relationships, and his attitude toward the Navy.

Prior to the above-mentioned interview each man had completed a form giving his past history of enuresis. The examiner then had at his disposal specific information in regard to duration and frequency of enuresis, and the individual's observations about situations which exacerbated or decreased the enuresis. Much of the interview was focused on this information as well as on the person's ideation toward enuresis and any limitations or discomfiture it might have precipitated during his life.

The recruits who were examined were seen after the interviewer had also acquainted himself with the individual's screening sheet. This is a form completed by the recruit when he enters service and records motivation for enlistment, history of any antisocial behavior, occupational and scholastic adjustment, group participation, the recruit's expected adaptation to naval life, somatic complaints (particularly those without probable organic basis), and evidence of any persecutory or paranoid ideation. Because each recruit is seen by a psychiatrist or a psychologist or both, when he enters service, and this screening form is used by the examiner during that screening interview, the com-

mentaries and prognostications for service adaptation made by that examiner also appear on these forms.

Another source of vital information about the recruits came from the company commander reports. These reports evaluate the recruit's performance and progress in training, estimate his naval aptitude, and describe his interpersonal relationships as viewed by the company commander. Inasmuch as it is customary for all enuretic recruits to be placed in the neuropsychiatric unit, the recruits described in this report were under such surveillance. Therefore further information was gathered from nursing notes relative to the behavior and attitude of the recruits while in the neuropsychiatric unit.

To verify any alleged history of chronic enuresis, social service reports were obtained from the home town of each enuretic. The report often afforded additional knowledge about the man, particularly concerning his developmental and environmental history.

## RESULTS

**Interview Situations.** As a group, the controls seemed less threatened by the interview, calmer, more co-operative, less dejected, and less apt to give evidence of emotional lability (such as crying). When one accounts for the realistic situation that the enuretics, being desirous of discharge, were more agitated merely by being kept in the Navy, there is no need to look further for such factors as intelligence to account for this observation. Even so, the only difference between the groups was that about 50 per cent of the enuretics showed muscular rigidity and tenseness during the interview, as compared with about 25 per cent of the controls showing the same overt uneasiness.

**Stature.** Forty (66.67 per cent) of the control subjects and 25 (41.67 per cent) of the enuretics were judged to be well developed, *i. e.*, they appeared to possess both average strength and bodily characteristics commensurate with their chronologic age. This observation is not of statistical pertinence. However, in view of the stereotyped opinion of the laity and the frequent assertion in the literature that the enuretic is physically immature, height and weight measurements at the time of entrance into naval service were tabulated from the service health records. Utilizing a critical ratio formula, it is found highly significant ( $P$  less than 0.01) that the controls, on the average, were taller and heavier (table 1).

**Attitude Toward Enuresis.** Fourteen of the controls had been enuretic prior to age 17. Eleven of these men had vigorously sought a cure through psychologic maneuvers and stated that they had overcome enuresis because of a parental stimulus or

elimination of personal "laziness." Only 11 of 60 in the experimental group told of similar attitudes.

TABLE I

	Controls	Enuretics	t	P
Average weight	135.7 lb.	144.1 lb.	13.03	<0.01
Average height	69.4 in.	67.7 in.	4.1	<0.01

In the enuretic group the most outstanding find was that 27 of these men readily admitted indifference to their habit and seemed placid and unperturbed in their resignation to the difficulty. Typical outlooks were: "Everybody knows there's nothing I can do about it;" "God made me do it, God will stop it;" or "It really doesn't bother me."

Forty-four of the enuretics volunteered feelings of shame and embarrassment, but usually only because of drastic social immobility due to bed-wetting, for example, "I couldn't even go to Boy Scout Camp," or "I can't stay with a girl overnight."

Five enuretics alleged repugnance to enuresis at the sensory level, because the bed was cold, wet, or malodorous. Five enuretics made spontaneous admission to an attitude which reflected a subjective opinion of their own diminutiveness, example, "It makes me feel mighty little," or "It's like I'm a small boy." The enuretics studied were not seriously hampered or distressed by the persistence of bed-wetting. In general they exhibited attitudes of indifference and shallow emotional regard for their defect.

**Vocational Aspirations.** As expected, the controls demonstrated more conation and loftier ambitions (table 2). It was interesting that in response to the question concerning future plans, eight of the enuretics first answered that they must work to care for someone else, usually their parents. The context of the interview allows interpretation of this response as emphasizing dependency problems in the enuretic, who projects his own desires onto his parents. The student, already more favorably endowed, is acquiring a useful trade while in the service and he has less conflict concerning his future independence.

**Avocational Interest.** Again, as expected, the controls showed a greater diversity of activity, although both groups had members who pursued categories of hobbies which were pursued in the other group (table 3). It is statistically significant that the controls had more than twice as many hobbies as the enuretic subjects ( $\chi^2=12.50$ ,  $P<0.01$ ). No significant differences could be found in the groups' inclinations to carving, hammering, and hunting. Whereas six of the students were photographers, none of the enuretics mentioned photography.

TABLE 2. *Vocational aspirations of controls and enuretics*

Future plans	Controls	Enuretics
None	10	16
Professional	4 (Medicine, law, teaching)	1 (Baseball)
Skilled labor or continuance of education	46	23
Unskilled labor	0	12
Farming	0	8

TABLE 3. *Avocational interests of controls and enuretics*

Hobby	Controls	Enuretics
None	19	28
Outdoor recreations	15	10
Mechanics	10	11
Crafts	10	3
Modeling	11	3
Music	5	2
Electronics	9	0
Collecting	7	2
Total	67	31

**Sports.** The athletic interests of the groups were, for practical purposes, identical (table 4). When it is considered that the controls, as a group, had greater opportunity for sports participation (more of them went to high school, fewer of them were forced to work) one wonders if the controls are less sports minded than usual or if the enuretics are particularly inclined to sports either because of pseudomascuine strivings or a "Peter Pan" complex.

**Neuropathic Traits.** Each group had approximately 24 persons who were nail biters, 5 who had been thumb suckers, 10 who stammered or stuttered, 20 who had suffered recurrent terrifying dreams which woke them from sleep, and 12 who had a history of temper tantrums.

Thirty-three of the controls and only one of the enuretics averred dreams in which they were engaged in sexual intercourse. Usually the female in the dream was a beautiful stranger, of the same age as the subject. Frequently, the sex partner was a

known girl with whom the subject had been intimate or would like to seduce. No clear-cut mother surrogate was depicted in these dreams. One control, with rampant homosexual problems, told of repetitive dreams in which he became "panicky" when another male would sit on his head.

TABLE 4. *Athletic interests of controls and enuretics*

Athletic interest	Controls	Enuretics
No interest	18	16
Moderate (some participation in organized athletics and some general knowledge about sports)	12	13
Active (greater interest than in moderate group)	30	31

A wide variety of phobic reactions, including aquaphobia, agoraphobia, hematophobia, astrophobia, claustrophobia, and electrophobia (in an Electronics School student), were mentioned in both groups. However, the striking discovery, statistically, was that 18 of the enuretics and only three of the controls in their opinion, sometime in their life, had had a nyctophobia ( $\chi^2=9.34$ ,  $P<0.01$ ). Eighteen of the enuretics and 11 of the controls suffered acrophobia. These men presented a consistent picture of a syndrome of vertigo and nausea in addition to anxiety when at relatively innocuous heights such as up in a silo or in a tree.

In the interview situation 16 enuretics and 2 controls knew of a past history of somnambulism. The statistical significance of the relationship between enuresis and sleepwalking is borne out clinically, by further observation on both bed wetters and somnambulists as reported by us in other articles.<sup>1,2</sup>

Some miscellaneous disturbances were present, singularly, in the enuretics and may be regarded as of only incidental interest. One enuretic, diagnosed as psychotic, had delusions concerning meat eating and was proud to be a strict vegetarian. Another enuretic recalled that in childhood, he would ingest any and all objects indiscriminately (pica).

Still another enuretic was a classic obsessive-compulsive dating from the death of a younger brother eight years before, following prayers by the patient that his sibling would die. His enuresis antedated the sibling's birth and preceded the formation of the neuroticism. This neurosis eventuated in serious mishaps, such as an automobile accident in which the patient compulsively turned his head 10 times and braked the pedal 10 times even

though he could reason that by acting with celerity he could have averted a collision.

The enuretics showed a greater spectrum of neurotic traits. The important trends were in the area of phobic reactions (enuretics were very susceptible to nyctophobia and acrophobia) and the proclivity to somnambulism by the enuretics. The majority of the controls had wish-fulfilling dreams of a sexual nature that probably were subsequent to a more suppressed attitude in procuring actual sexual gratification.

**Special Fears.** Table 5 lists "special" fears experienced by the enuretics. In all cases the enuretic alleged existence of these fears because he wondered whether or not he was different from others. Then too, there was the practical matter of sharing a wet bed with a lifetime soulmate. Some of the men feared transmitting their defect to an offspring.

TABLE 5. *Special fears noted by enuretic and control subjects*

Fear	Controls		Enuretics	
	Number	Per cent	Number	Per cent
Afraid to marry	0	0	28	46.67
Afraid he may be sterile	0	0	10	16.67
Afraid he may be impotent	0	0	6	10
Afraid he may go insane	0	0	4	6.66
None of above fears	60	100	12	20

These special fears are probably peculiar to the male enuretic whose immaturity habit plays havoc with the resolution of normal problems of adolescence. On a deeper plane, the data would reinforce the impression that the adolescent enuretic has much doubt relative to his adequacy as a man and to his ability to perform satisfactorily as a man.

**Bed-Wetting Factors.** Seventeen of the enuretics and 3 of the 14 controls who had been enuretic noted that having a dream in which they were urinating was associated often with frank enuresis. Eleven of the enuretics and two of the controls had been excessively teased by family members because of bed-wetting. The mothers of 21 of the enuretics cleaned the bedding following enuresis.

Men in both groups were perplexed concerning situations which increased or decreased their likelihood to bed wet. Both groups indicated the importance of fluid regulation following supper, and both groups of men noted that bed-wetting might occur when



they got cold from lowered room temperature or fewer blankets. In the experimental group, other factors which were associated with increased enuresis were nervousness, exercise or work, and "heavy" sleeping. The factors which decreased enuresis were sleeping in an orthopneic position, staying up past midnight, and sleeping during the daytime (rather than at night).

The enuretics seemed willing to inconvenience their mothers, whom they expected should manage their bedding. Like the finding of propensity to "urinating" dreams, this is in agreement with the investigations on the child enuretic. Any suggestive trend in this material would support an hypothesis that the enuretic has disturbances in the physiology of his sleep.

**Sleeping Arrangements.** Table 6 lists sleeping accommodations of controls and enuretics. Whereas only 14.3 per cent of the controls had slept with another enuretic during their period of enuresis in childhood, nearly 25 per cent of the enuretics slept with another enuretic. Usually he was not competitive with the enuretic sibling in an effort to cease bed-wetting. In all cases where the enuretic slept with someone else despite the habit, the other person was not excessively annoyed when made wet.

TABLE 6. *Sleeping accommodations*

<i>Accommodation</i>	<i>Controls (while they were enuretic in childhood)</i>	<i>*Enuretics (in the 3 years prior to enlistment)</i>
Slept alone	7	44
Slept with enuretic brother	2	13
Slept with older sister	0	1
Slept with nonenuretic brother	5	8
Slept with father	0	3
Slept with mother	0	1

\*Some enuretics had had several combinations of sleeping arrangements, thus the total of 70 responses in this column.

The overwhelming majority of enuretics persisted to bed wet even though they slept alone and there was no need to continue the habit in order to agitate for more "living space" or special accession from the family.

In the case of the teen-ager who slept with his mother until one and one-half years before entering service, he was the one who demanded a modification in the sleeping accommodations. He remarked cogently, "It don't look good for a man to be sleeping with his ma."

**Heterosexual Activity.** Forty (66.67 per cent) of the enuretics and 32 (53.33 per cent) of the controls had experienced sexual relations. The examiner believed that the enuretics were more honest in discussing this topic. Many of the controls responded without conviction and sincerity and often gave answers which they anticipated the interviewer would expect. There is no doubt that the enuretics, even though a younger group who had spent much less time away from home, began having intercourse at an earlier age and had succeeded in enticing more women. The best explanation for this observation is that the enuretic's cultural milieu is more accepting of early, frequent, and diversified heterosexuality.

**Adjustive Capacity.** For purposes of estimation, besides the subject's candid opinion, the history of authority relations, group participation, criminal activity and naval record was considered. The enuretics showed devaluated estimations of adjustment in all areas compared. The controls, although intellectually superior enlisted personnel, showed a high percentage of maladjustment (for example in civilian life many had failed academically or were socially unaccepted by their peers). These men, because of emotional difficulties, had never been as highly productive as their potentialities imply. Even so, by comparison the enuretics demonstrated extremely inept adjustment as a life-long pattern in all endeavors (table 7).

TABLE 7. *Estimated adjustive capacity of controls and enuretics*

Area of estimated adjustment	Controls		Enuretics	
	Number	Per cent	Number	Per cent
Interpersonal relations estimated as less than adequate	16	26.7	21	35
School adjustment estimated as less than adequate	21	35	39	65
Service adjustment estimated as less than adequate	21	35	47	78.3

**Psychogenetic Dynamics.** Parents of 26 enuretics and of 4 controls were in chronic ill health during the subject's childhood (table 8). None of the mothers of the controls were ill, but some of the mothers of the enuretics were incapacitated or semi-invalided from a variety of "nervous conditions" (apparently nonpsychotic) and arthritis. The fathers of 5 enuretics were alcoholics who developed ulcers which were complicated by hemorrhagic bouts, intractability, or obstruction. The "cripples" listed were the end results of traumatic or occupational processes such as farm

TABLE 8. *Psychodynamic factors as reported by enuretic and control groups*

Dynamic factor	Controls	Enuretics
Father regarded as authoritarian	26	22
Open conflict with father	10	12
Father was physically abusive	7	10
Father regarded as alcoholic	10	15
Mother regarded as authoritarian	6	5
Open conflict with mother	8	1
Mother regarded as seductive	7	15
Father verbalizes suspicion of mother's fidelity	3	8
Subject was favorite of father or mother	4	4
Subject was favorite of both parents	1	3
Evidence of a severe sibling rivalry	7	23 *( $\chi^2=7.5$ $P<0.01$ )
Parents regarded as strict	2	13 *( $\chi^2=6.66$ $P<0.01$ )
Parents regarded as religious	14	12
Alleged idyllic home situation	36	31
Number of parents regarded to be in chronic ill health	4	26 *( $\chi^2=14.7$ $P<0.01$ )
Reared in a broken home	16	14
Verbalizes martyrdom to family	0	5
Number of married men	2	4
Verbalizes a belief that wife is unfaithful	0	4
Verbalizes that a divorce is being seriously considered	0	3
Average age of mother	48.7	43.0
Average age of father	49.7	47.9

\*Of statistical significance.

accidents or debilitation from mining. There is no doubt that the emotional and financial deprivation subsequent to a long-standing, disabling disease in a parent (table 9) renders the enuretic group psychologically more vulnerable. It is significant that in such an atmosphere of insecurity the enuretic's personality development is further thwarted by his belief that his parents are very strict.

The child enuretic, like these teen-agers, has sibling rivalries (table 10). A breakdown of our data does not demonstrate that the birth of a rival is directly related to enuresis; 12 of the 23

rivalries in the enuretics were with older siblings. The usual nucleus for rivalry was a sibling who was more gifted in intellect, talent, physical prowess, or comeliness. In the younger male rivals, the younger brother (or twin), as a teen-ager, nearly always overshadowed the subject in athletics and popularity. One enuretic, bitterly jealous of a half sibling twice his age who supported him, believed his mother welcomed sexual advances by the half sibling.

TABLE 9. *Chronic illness in parents of controls and enuretics*

Chronic illness in parents	Controls	Enuretics
Mother		
"nerves"	0	9
arthritis	0	2
Father		
ulcer	1	0
alcoholic and ulcer	0	5
cripple	1	4
"nerves"	0	2
cancer	2	1
cardiac	0	3

TABLE 10. *Sibling rivalry*

Severe sibling rivalry	Controls	Enuretics
Rivalry with older sister	2	4
Rivalry with older brother	3	8
Rivalry with younger sister	1	4
Rivalry with younger brother	1	6
Rivalry with twin	0	1

The remaining psychogenetic material fails to sustain statistical significance in this series of cases. Once more though, there are some hints of similarities in the enuretics. The father is regarded much the same in both groups and both groups have a majority of men signifying an ideal home environment. About equal numbers of men in both groups were reared in a home broken before age 10 by death, desertion, separation, or divorce. However, the marriages seen by the enuretics are negatively influenced by a seductive mother whose loyalty is doubted by the father. In this respect it should be emphasized that only two of the seven controls who made reference to their mothers' charming physical attributes, did so in the same manner as the enuretics. The enuretic beamed as he related how he is mistaken

as his mother's husband or how "guys whistle and stomp when she walks down the street . . . she's got a real built . . . what a doll!" The qualitative difference was so great that even though quantitatively there was no statistical difference in the groups, clinically the enuretics studied were prone to think of their mothers as dazzling and irresistible sirens.

This image of mother may be basic in moulding the attitude toward marriage which was previously indicated. In the few cases of married enuretics, the women were mother surrogates who zealously indulged their husbands' dependency needs and stoically suffered being wet in bed. Yet this female is unsatisfactory to them because she is considered to be too desirable by other more capable males.

Dependency conflicts were responsible for the statements of selfless sacrifice made by the enuretics. As one enuretic pointed out, while defending a putative urgent need to be home caring for a healthy mother, "The trouble with the Navy is that most boys don't care enough for their mothers."

**Personality Diagnosis.** On the basis of available documents plus the brief interview, a personality formulation was made on each person with an attempt to assess him diagnostically (table 11). The multiple obstacles to such an ambition did not diminish its desirability. The diagnoses were made in accordance with the procedure outlined in the *Joint Armed Forces Nomenclature and Method of Recording Psychiatric Conditions*,<sup>2</sup> save for the cases of psychopathic personality which are better described as certain men unable to profit by past experience, who lack a super ego or conscience, and who demonstrate the criteria of Cleckley.<sup>4</sup>

TABLE 11. Diagnostic assessment

Diagnosis	Controls	Enuretics
Without psychiatric diagnosis	27 (45 %)	9 (15 %)
Passive aggressive-passive dependent	18 (30 %)	25 (41.67%)
Inadequate personality	0 (0 %)	7 (11.67%)
Psychopathic personality	2 (3.33%)	2 (3.33 %)
Schizoid personality	12 (20 %)	9 (15 %)
Schizophrenic	1 (1.67%)	2 (3.33 %)
Obsessive-compulsive neurosis	0 (0 %)	2 (3.33 %)
Emotional instability reaction	0 (0 %)	3 (5 %)
Aggressive reaction	0 (0 %)	1 (1.67 %)

Psychometrics were obtained on each man. Three of the enuretics were of subnormal mentality. In those instances, a predominating character defect was made the primary diagnostic consideration.

One emotionally unstable enuretic required an emergency operation to repair the left brachial artery which he severed in a suicide attempt immediately after being reprimanded for failure to carry out prescribed chores in the neuropsychiatric unit. At the same interview he was informed that because he was an epileptic he would be retained in the Navy until processed for medical discharge, rather than gaining a rapid separation by means of a general discharge.

### DISCUSSION

"All manners of children from aggressive to recessive, restless to quiet, happy to sad and irritable to pleasant are included."<sup>5</sup> These are the words of Dr. Evans, for which "men" can be substituted for "children" to depict the emotionality of recruits plagued with the symptom of enuresis. McGuinness<sup>6</sup> has ascribed the symptom as expressing: (1) aggression in retaliation to fear, hatred, jealousy, or inferiority; (2) desire for attention; (3) protestation to parental domination; and (4) regression to or retention of things enjoyed in infancy. Our study would sustain such an hypothesis inasmuch as we discovered many men who exhibited these mechanisms either singly or in admixture.

A splendid study of the child enuretic shows the boy bed wetter as a youth who behaves as if inferior to his fellows and who identifies with women thus enabling him to avoid the active male role.<sup>7</sup> Anderson<sup>8</sup> noticed the child enuretic to be sensitive and unable to assume responsibilities as well as his peers. In the idiomatic, such infantile attitudes are those of "cry babies." As a group, the teen-age enuretics are "cry babies" who are insatiate in their expectations from the environment but who fail to reciprocate or grudgingly reciprocate even the slightest favor. As young adults they still shun responsibility and continue to behave as hypersensitive and inferior.

It was elected to circumvent the charged area of masturbation in the interviews. The theory that enuresis, in children, is a masturbatory equivalent or substitute concludes that enuresis may cease in puberty when masturbation begins to be overt. However, young sailors are happier to discuss their heterosexual achievements and expectations than their autoeroticism. Furthermore, in the interview so much material was requested that queries concerning masturbation might menace spontaneous verbal productions. Finally, a high frequency of masturbatory problems could be anticipated because of the age of the population studied.

The psychodynamic motif of some young male enuretics emphasizes lifelong inability to cope with their environment and establish emotional maturity. Dependency conflict looms ubiquitously and detrimentally penetrates all facets of their lives, particularly their sexual attitudes. They exert themselves to defend against dependency through promiscuity. Yet such striving is doomed to failure because they are unable to relinquish their fantasy of themselves as helpless little boys or to banish their conscious image of their own inadequacy. Each realistic failure in life, whether it be in school, or in the gang, or in the service, further entrenches their need to gratify dependency and further confirms their belief in their own inferiority. It is this cycle which, after years of existence, brings forth the astonishing "piss on you" facade, which the enuretic recruit so flagrantly displays when seen in naval training. It is at this juncture that the symptom of enuresis expresses the psychic difficulties mentioned by McGuinness.

Similar to other military studies, the enuretics in this investigation demonstrated marginal civilian and military adjustment.<sup>11</sup> Likewise, they were amazingly indifferent to their immaturity habit, and when they married they found masochistic wives who were unperturbed by their husband's enuresis.

Space does not permit extensive elaboration of all the dynamic possibilities connected with the low social, marital, and military adjustive capacity of the enuretic. The indication from this investigation is that the enuretic is part of a family constellation in which enuresis is permissible, if not commonplace. Such permissiveness reflects the vacillation of the parents, whom the enuretic, nevertheless, regards as strict. Accordingly, the enuretic grows up under a regimen of indecisiveness and inconsistency. In such an environment the enuretic develops hostile feelings toward a more successful sibling, who is not necessarily receiving parental preference. In fact, the parents themselves are more concerned about pressing health problems which impair seriously the earning capacity of the family and/or the amount of parental attention to the children. On top of these considerations, the enuretic sometimes is made even more insecure because of parental bickering concerning the fidelity of a provocative mother. For definitive therapy, amelioration of these family conditions would be implied.

There are organic factors of etiology which are suggested by this study besides the obvious correlations of enuresis with disturbances of sleep physiology, gross physical immaturity, and the relationship of enuresis to fluid intake. The medical historian tells of Paulus Bagellardus of Padua, author of the first pediatric text, who noted a relationship between enuresis and cold and humidity.<sup>12</sup> The men in this study make a similar empirical

observation. The physiologic basis for these relationships should be elucidated.

A majority of enuretics stated that their problem was decreasing as they got older. Many of these men could optimistically cite family members who had finally quit bed-wetting while in their early twenties. It is problematical, at present, if this decrease in enuresis is secondary to psychic factors (establishment of masturbation or heterosexuality), social factors (being forced into a more independent status and discovering an ability to perform independently), or organic factors (delayed neurochemical maturation).

Presently, we view enuresis as a continuum in which psychic, social, and organic factors are important in varying proportions. Those cases most clearly psychosocial are usually resolved by the teens. The male who continues to bed wet through adolescence is thought to have a large component of organicity compounding a lifetime of unfavorable psychologic and social circumstances, which perpetuate symptomatic immaturity. It is this group of men who should be scrutinized most carefully by the Navy, because entrance into the service may so modify a psychosocial situation that "organic" remedies may effect a salvaging of manpower.

The enuretics we studied may be described as having "Peter Pan" complexes. They are young adults who have refused to grow up and who are unwilling to accept responsibility. They find gratification chiefly in boyhood pursuits and hesitate to consider serious competition with men.

#### SUMMARY

Sixty enuretic recruits and 60 nonenuretic Electronics School students were studied. Compared with the controls the enuretics were physically smaller on entrance into the naval service. They were characteristically indifferent about their habit and less optimistic of establishing vocational independence. The enuretics exhibited a wide variety of neurotic traits and special sexual fears. They were less successful in all areas of adjustment. It was significant that they had more sibling rivalries and that their parents were strict and prone to have chronic illnesses. Psychologic, social, and organic factors are presented as possible etiologic agents. The term "Peter Pan" complex is submitted to describe the personalities of the enuretic naval recruit.

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### MAN AND MACHINE

"Man made the machine but instead of remaining its master he is gradually becoming its slave. Under the impact of machine civilization, man becomes more and more machine-like himself. Instead of leaving to the machine those functions which can be performed with automatic repetition, he is in the process of automatizing and routinizing those functions which require choice and inventiveness. . . . Instead of evaluating a person as a unique combination of his constituent elements he tends to disregard the unique features for what is common and measurable. He deals with his fellow man on the basis of crude categories such as race, social group, height and body weight, number of credits which he received in his classes, man hours and all the data which can be counted and put on a punch card. Instead of using the machine for what it was invented—to give him freedom to use his creative faculties—he wants to organize society, taking the machine as a model. It must be obvious that technology does not need to lead to a loss of spiritual freedom, a loss of respect for individual differences, and to increasing security. On the contrary, it could be used for increasing freedom and encouraging the luxury of individuality. The universal state is by no means a logical, inevitable outcome of industrial civilization."

—FRANZ ALEXANDER, M. D.  
in *American Journal of Psychiatry*  
p. 696, Mar. 1956

# RADIATION PROTECTION IN THE DIAGNOSTIC X-RAY DEPARTMENT

NORMAN BOLKER, *Major, USAF (MC)*

ONE OF THE primary responsibilities of a radiologist is the protection of his patients and personnel from ionizing radiations. By the use of simple precautions he can reduce radiation exposure to a minimum.

The National Committee on Radiation Protection, in 1948, selected 0.3 r per week as the maximum exposure that could be received repeatedly without demonstrable effect upon the recipient. In their latest recommendations,<sup>1</sup> the committee has changed the term "maximum tolerance dose" to "permissible dose" to remove the implication that this dosage is harmless, and to take into account the calculated risk of genetic damage.<sup>2</sup>

The dosage figure remains unchanged and the Committee states that under present conditions and for some time to come, it will not consider genetic damage to the population as a whole a limiting factor in setting the permissible level. However, as exposure of the general population increases through expanded use of ionizing radiations in medical, industrial, and military operations, the problem of mass genetic damage will eventually become of greater importance and permissible dose to the gonads may have to be decreased.

While chromosomes are highly resistant to change in vivo by chemical and most physical agents, they are startlingly sensitive to exposure to ionizing radiations. No dose is too small to disturb chromosome bonds and genetic linkages, as there is no threshold dose.<sup>3</sup> This means that there is no such thing as a tolerance dose for the germ cells, as any dose can produce permanent changes. The quantity of dose affects the mutation rate in a linear fashion. The nuclear structures lack the ability to recover possessed by the extranuclear components of the cell. Consequently the effects of radiation are cumulative, and the sum of numerous small doses occurring over a prolonged period produces the same amount of genetic change as an equivalent amount of radiation in a single exposure. Mutations, whether spontaneously occurring or radiation induced, are almost always

harmful. Most mutations are recessive and will remain concealed until the cell is fertilized by an identically altered germ cell. As radiation exposure of mass population increases, opportunity for such a union improves. It is clear that radiologists should strive to keep gonadal exposure of patients and personnel to a minimum.<sup>4</sup>

Among measures to be employed is the exercise of discretion on the part of the physician in ordering examinations of the pelvis and abdomen, so that the information gained will warrant the calculated risk of exposure.<sup>5</sup> It must be remembered also, that most examinations of infants constitute total body exposure. Exposures to the chest, skull, and extremities are not involved in this consideration, as they do not carry a significant dose to the gonads.<sup>5</sup>

The protection problem consists of two phases: (1) patient protection and (2) personnel protection. Reducing patient exposure indirectly reduces personnel exposure by limiting scattered radiation. However, the chronic nature of the exposure of radiation workers introduces additional factors for consideration.

#### PROTECTION OF THE PATIENT

**Radiographic Exposure.** Reduction in the size of the beam of primary irradiation not only reduces the volume of tissue irradiated but also decreases the amount of secondary radiation. This is accomplished by the constant use of cones which limit the field size to the smallest area compatible with demonstrating the area of interest. In radiographic examinations including the gonadal area, a leaded rubber strip of 0.5 mm lead equivalence should be draped over the pubis in men, and over the lower pelvis in women, provided it does not conflict with the purpose of the examination. This will absorb more than 90 per cent of the radiation produced by a typical radiographic exposure. All parts outside of the field of interest should be protected in infants and young children.<sup>1</sup>

Inasmuch as decrease in radiation intensity is proportional to the square of the distance from the source (that is, it will be one fourth of the amount at 2 feet from the x-ray tube as it is at 1 foot), the maximum practical tube-film distance should be used. This should be no less than 36 inches. The radiation output at tabletop can be reduced to one fourth of its unfiltered value by the addition of 3-mm aluminum filter to the tube head.<sup>4</sup> This can be accomplished without perceptible effect on radiographs in the range of 70 to 100 kv and absolutely should be used on both radiographic and fluoroscopic portals.

**Fluoroscopic Exposure.** The fluoroscope is a dangerous instrument if improperly used. Few physicians, radiologists among

them, know the roentgen output of their fluoroscopes. These should be calibrated by means of an r-meter with a 0-25 r ionization chamber. Tabletop air dose per minute without backscatter can be determined by placing the chamber in the center of the field with the fluoroscopic shutter closed down to the ordinary field size and making a one-minute exposure with the controls set at the usual fluoroscopic values.

Unless efforts have been made to reduce the exposure, findings may be alarming. Outputs in excess of 100 r per minute are not unusual in fluoroscopic units operated at high milliamperage, short tube-tabletop distance, and no filtration.<sup>9</sup> These can produce a skin erythema and serious epiphyseal and gonadal damage in the course of a single examination.

Reduction of the fluoroscopic output without interference with the brilliance of the image is obtained by the use of a small field no greater than 10 by 10 cm, a screen with a speed equal to that of the Patterson B2, and a fluoroscopic tube-tabletop distance of no less than 18 inches.

Kilovoltage setting should be in the range of 80 to 90, and the milliamperage 3 or less.<sup>10</sup> After about a 15-minute period of dark adaptation, satisfactory visualization can be obtained with settings as low as 1 ma., and because output is almost directly related to milliamperage, the importance of a low setting is apparent.

Using these means, fluoroscopy can be performed with an output as small as 1.5 to 4 r per minute. Units with an output in excess of 10 r per minute should be modified to reduce radiation production.

The period of actual fluoroscopic exposure should be kept to a minimum. The tube should not be activated until the patient is placed in the desired position, all preparations are complete, and the radiologist is psychologically set for a glimpse of a specific structure. With practice, actual fluoroscopic exposure time need not exceed an average of two minutes for an upper gastro-intestinal or barium enema examination. Only the exceptionally difficult case should take as long as five minutes. An automatic timer is an aid in training one in rapid fluoroscopy.

#### PROTECTION OF PERSONNEL

**Radiographic Exposure.** Protection of personnel involves consideration of proper installation of equipment and barriers as well as maintenance of proper protection practices.<sup>11</sup> Principles of construction are thoroughly described in the National Bureau of Standards Handbook 20.<sup>12</sup> In brief, the radiographic room should be of adequate dimensions, at least 12 by 12 feet, to reduce backscattering from the walls. This is still an important con-

sideration despite the fact that nowadays dealers in x-ray equipment make a selling point of the small space into which their equipment will fit. The barrier at the control panel should be at least 6 feet from the tube. Protection in the barrier wall is usually calculated for the reduced kilovoltage of secondary radiation, so the primary beam should never be turned toward the control panel. The walls and doors should contain sheet lead 1 mm thick or its equivalent.

Effectiveness of protection by the tube casing should be checked and not assumed, particularly in old units and after introduction of new tube inserts. Radiation should not exceed 0.1 r per hour at a distance of 1 meter. Windows in control panel barriers should be tested originally by film badge or survey meter to verify their protective qualities.

Technicians should be so well versed in protection practices that proper action is automatic. They should be observed while working to see that they stand completely behind the barrier during an x-ray exposure. Frequently, the careless technician will leave part of his body unprotected as he steps back from checking the patient's respiration, or he will stand in a doorway during an exposure.

Under no circumstances should full-time x-ray personnel hold patients during radiography. Even the wearing of leaded gloves and apron does not make this action permissible. If mechanical restraints are not sufficient, nonradiologic personnel should be drafted for this purpose and an effort made to avoid frequent use of the same persons.

**Fluoroscopic Exposure.** The greatest incidence of radiation exposure occurs during fluoroscopy, and this involves principally the radiologist and, to a lesser degree, his assistants. While the radiologist accepts the idea of wearing a leaded apron, he often neglects to supply them to his aids. It is the radiologist's responsibility to furnish aprons to his assistants and to see that they use them. Aprons and gloves should be scrutinized periodically to detect any break in the protective surface.

The technicians and radiologist should be aware of the location of the potential danger areas in the fluoroscopic room. These are the regions immediately behind the table when it is upright and immediately lateral to the patient both when the table is upright and horizontal. These are the zones of greatest intensity of scattered radiation generated within the patient.\*

Technicians often stand beside the patient, particularly after giving him a glass of barium or when observing fluoroscopy. They should be instructed to hand the patient the glass and then step back either behind the barrier or the radiologist.

With the table upright, the radiologist should sit well in front of the screen, taking care to keep his feet from beneath it. The fluoroscopic field should be centered to the screen so that the radiation can not sweep around its edges. The fluoroscopist should acquire a chair with a protective front if available.

If the fluoroscopic screen is not equipped with a leaded rubber sheet which hangs between the side of the table and the radiologist when the table is in the horizontal position, a similar sheet, about two by three feet wide, can be mounted on a wooden lathe and be suspended from the ceiling for this purpose. By counterweighting, the sheet can be kept well out of the way when not in use. As an additional protection feature, late model tables often contain a metal strip hinged to the Bucky tray that obliterates the Bucky slot, thus further reducing the quantity of secondary radiation at the fluoroscopist's genital level.

Because the forearm between the glove and shoulder on the side used for palpation is the portion of the fluoroscopist's body receiving the greatest radiation exposure, he should avoid placing his gloved hand in the fluoroscopic field. All palpation should be done with the current off and reliance should be placed upon the pressure cone for demonstration of tissue flexibility and mucosal pattern.

Personnel should be monitored either by carrying a pocket dosimeter or by wearing film badges.<sup>13</sup> Pocket dosimeters easily get out of adjustment and more reliance can be placed on film badges. A rough estimate of exposure can be made with the use of dental film, but an accurate determination is available with the use of step filtered film badges.<sup>\*14</sup>

A complete blood count is not satisfactory as a monitoring device, because chronic overexposure could occur before significant changes became evident.<sup>15</sup> It is recommended as part of the pre-employment physical examination of radiation workers for medico-legal reasons and should be repeated semiannually as a means of reassurance.<sup>16</sup>

The prime measure for checking on the efficiency of radiation protection is an annual radiation survey using the survey meter. If such an instrument is not available, services of a radiation physicist should be obtained to perform the investigation. This should be done early in the use of a new installation. Thus, any deficiency can be promptly detected. No area in the department is impermeable to radiation, but the regions of relatively high dosage can be determined. Movement of stations a few feet

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\*These are now distributed to Air Force personnel by the Air Materiel Command and are obtained by writing to Commander, Air Materiel Command, Attn: MCDPL, Wright-Patterson Air Force Base, Ohio.

may greatly alter the quantity of personnel exposure. An effort should be made to keep the dosage rate below 36 mr per hour ( $10^{-3}$  r per second).<sup>17</sup> However, this figure is based on an assumed continuous exposure as might possibly occur in a therapy installation. In view of the extremely short exposure intervals occurring in a diagnostic radiology department, a 100- to 200-fold margin of safety is present at this level.

### OBSERVATIONS AT THIS HOSPITAL

The findings on tube calibration and radiation survey of the x-ray department of this hospital in an investigation of 27 June 1955 are shown in tables 1 through 4. Barriers consist of 2 mm of sheet lead on a wooden frame, and are situated 6 feet from the tube stand. All walls contain 2 mm of sheet lead, and all primary beams are filtered by 3 mm of aluminum, except for the urographic unit which contains 2 mm. Dosage is calculated as air dose without backscatter.

TABLE 1. Radiographic unit KX 19

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Radiation output, primary beam at table top
Fluoroscopic settings (10- by 10-cm field)
83 kv, 1 ma.—1.6 r/min
83 kv, 3 ma.—3.5 r/min
Peak radiographic exposure
130 kv, 200 ma., 0.4 sec, 40-inch distance—1.8 r
Stray radiation survey
Radiologist's position during fluoroscopy, leaded sheet interposed—6.0 mr/hr
During radiography
Behind control barrier—20 mr/hr
Hallway behind leaded wall—1.6 mr/hr

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TABLE 2. Radiographic unit with LRT 1-2 tube

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Radiation output of primary beam at tabletop
Peak radiographic exposure
100 kv, 200 ma., 1 sec, 38-inch focal-film distance—3.0 r
Stray radiation during peak exposure
Behind control barrier—35 mr/hr
Hallway behind leaded wall—4.0 mr/hr

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TABLE 3. Photofluorographic unit

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Radiation output of primary beam at screen surface
Peak radiographic exposure
89 kv, 200 ma., 0.35 sec, 32-inch focal-screen distance—1.8 r
Stray radiation during peak exposure
Behind control barrier—2.0 mr/hr
Adjacent hallway through leaded wall
Anterior to radiographic tube—30 mr/hr
Posterior to radiographic tube—15 mr/hr

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TABLE 4. *Cystoscopic room*


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Radiation output of primary beam at tabletop
Peak radiographic exposure
100 kv, 100 ma., 1.5 sec, 36-inch focal-film distance—2.8 r
Stray radiation at peak exposure
Control barrier, leaded portion—5.0 mr/hr
Control barrier, defect in lead sheet—150 mr/hr
Hallway by open door—35 mr/hr

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## SUMMARY

Although the problem of protection from the effects of ionizing radiation has been with us since the world became aware of the injuries suffered by the pioneers in radiology, the focus of concern has shifted from the field of somatic injuries to that of genetic injuries.

This changed perspective has resulted from a lowered incidence of gross overexposure following better understanding of methods of protection; an increase in the number of people subjected to radiation exposure as a result of increased medical, industrial, and military use of x-ray generators and radioactive materials; and the discovery that genetic injuries can be produced by exposure to radiation in amounts well below the so-called maximum tolerance dose.

The concept of the permissible dose includes the acceptance of a limited degree of genetic damage to a limited population so that mankind's genetic stream, though altered, will not be overwhelmed by undesirable traits. The amount of damage that is acceptable is a matter of philosophy. There is no experimental evidence specific to man that would indicate what this dose should be. It is obvious that efforts to reduce gonadal exposure to radiation should be as thorough as practical means will allow.

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### HAZARDS TO MAN OF NUCLEAR RADIATIONS

"The inhabitants of this country may receive in the next 50 years, from nuclear weapons already exploded, about 0.02% to 0.04% of the radiation that they will receive during the same period from natural sources. If the firing of bombs were to continue indefinitely at the same rate as over the past few years, there would be a build-up of activity, gradually reaching a plateau in about a hundred years, which would give the average individual a dose over a period of 30 years of about 1% of what he would receive in the same period from natural sources. The individual and genetic effects of such a dose of external radiation would be insignificant."

—Reprinted from *Hazards to Man of Nuclear and Allied Radiations*, H. M. Stationery Office, in *The Lancet* p. 949, June 1956

# LIGATION OF THE UMBILICAL CORD

PHILIP K. NELSON, *Captain, USAF (MC)*

**B**LEEDING from a ligated umbilical cord stump in its most severe form poses a serious threat to the life of a newborn infant. In its mildest form, when detected early, it is a nuisance requiring time-consuming religation. The incidence of bleeding from the stump after ligation of the cord with one or two ties of umbilical tape has been reported as occurring in from 4.4 to 10.0 per cent of cases.<sup>1,2</sup> Current textbooks of obstetrics and pediatrics contain only brief reference to this commonly accepted, unsatisfactory method of ligation.<sup>3-6</sup>

Umbilical tape, being an inelastic fabric, fails to maintain sufficient tension on the vessels within the rapidly shrinking cord, and thus bleeding occurs. Although most obstetricians have accepted this fact without protest, some have devised a variety of clamps to solve the problem of cord hemostasis. The first was described in 1922 by Ziegler<sup>7</sup> and was modified in form, but not in principle, in 1936.<sup>8</sup> This latter model of the Ziegler clamp is currently in wide use. Other appliances in this category were described by Kane,<sup>9</sup> Kahn,<sup>10</sup> Pastore,<sup>11</sup> and Fist.<sup>12</sup> Although these clamps were successful in guaranteeing hemostasis, they had the disadvantage of being bulky, cumbersome to apply, injurious to the cord attachment, or costly.

A new approach to this problem was furnished by Kanner<sup>13</sup> in 1939. He suggested ligating the umbilical cord with a standard rubber band. The rubber band was looped around the cord and both ends were brought out through a perforated lead shot. The band was stretched to apply tension to the cord, and the shot was compressed to hold this tension. He reported no delayed bleeding in 1,500 cases. This method was successful because it took into consideration the shrinkage of the cord as Wharton's jelly dried. Save for slight difficulty in applying the band, it lacked the other objectionable features of the clamps described above.

In 1950 Mayes<sup>2</sup> suggested dissection and separate ligation of the umbilical vein and arteries. This represented a new approach, equally successful, to the problem of shrinkage and delayed bleeding. Technical difficulties, admittedly slight, have apparently prevented widespread acceptance of this method.

A new method reported herein has been in use in this country for the past six years and has met with considerable success. It affords complete hemostasis and has none of the objectionable features of the above-described devices and methods. At present it is used in only a few sections of the United States, but because of its obvious advantages more widespread use is warranted. In 1950 Krakower and Nabolotny<sup>1</sup> reported on its use and credited Silesky, a Ukrainian physician, with devising the method at the Displaced Persons Regional Hospital, Aschaffenburg, Germany. The method was introduced to this country by Doctor Nabolotny.

### MATERIALS

The materials required for cord ligation are: (a) three curved Kelly clamps (sterile), (b) one pair sterile scissors, and (c) one section of standard rubber intravenous tubing from 3 to 4 mm long. Discarded intravenous tubing is used, preferably the rubber sections found on blood recipient sets. The tubing is cleansed, cut into segments from 3 to 4 mm long, and stored in 1:1000 aqueous Zephiran (brand of benzalkonium chloride).

### METHOD

The following method has been used by the author and differs only slightly from that described by Krakower and Nabolotny.

1. After delivery of the infant the cord is observed until pulsations have ceased. It is then doubly clamped with Kelly clamps and divided between the clamps. The segment of cord attached to the infant should be from 10 to 15 cm in length.

2. Sterile gloves are applied and the rubber band is manually placed on the end of the third Kelly clamp, which at this time is closed. The band is placed 5 mm from the end of the clamp.

3. This clamp is opened and the band stretched. The clamp at the end of the cord is removed and inserted through the rubber band, re-grasping the end of the cord. The cord will not bleed during this maneuver (fig. 1).

4. The cord is then drawn through the band so that the band is finally placed from 1 to 1.5 cm from the abdomen. The clamp is then gently teased from within the band.

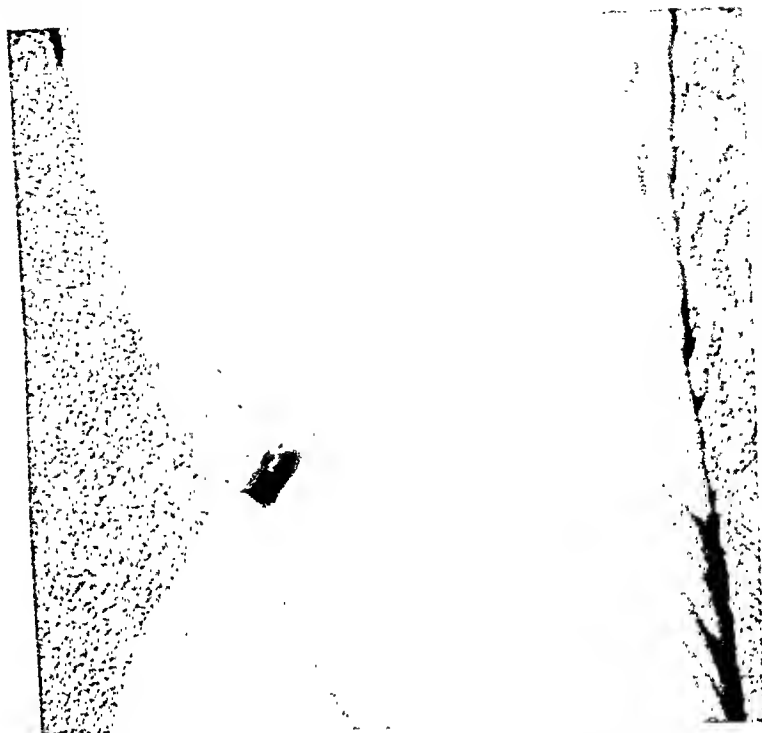
5. The cord is then recut 1.5 cm distal to the band, and the end of the cord is wiped with an alcohol sponge. Cord dressings are optional and were not used in this series.

Figure 2 shows completed application of the band.

This method has been used in over 600 cases without a single instance of delayed bleeding from the stump. There have been no cord infections that could be traced to this method. On rare



*Figure 1. Application of band ligation.*



*Figure 2. Band ligation in place immediately after application.*

occasions a cord may be encountered which is so large that application of the band is impossible. Ligation with umbilical tape and close observation is then indicated.

### ADVANTAGES OF METHOD

Krakower and Nabolotny's article listed the following advantages, and their opinions were substantiated by my present series. (a) The method is quick and simple to perform. (b) There is no danger of trauma to the cord or its attachment. (c) The rubber band will not slip or loosen. (d) There is no danger of subsequent bleeding and consequently no necessity for retying. (e) There is no expense associated with this method since the bands are derived from discarded rubber tubing.

### SUMMARY

A technic for ligating the umbilical cord is presented which is quick and easy to perform, involves no expense, and eliminates the danger of bleeding from the ligated stump. More widespread adoption of this method is suggested.

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*God's interest in the human race is nowhere better evinced than in obstetrics.*—Martin T. Fischer

# DETERMINATION OF PROTEIN-BOUND IODINE BY THE LEFFLER METHOD

WILLIAM J. REALS, M. D.

FRANK M. TOWNSEND, *Colonel, USAF (MC)*

RICHARD E. DANIELSON, A. B., M. T. (ASCP)

**T**HE DIFFICULTIES of exact diagnosis of thyroid disease by established methods are well known.<sup>1-4</sup> Although radioiodine  $I^{131}$  is used extensively, there are various reasons why determination of protein-bound iodine still appears to be the method of choice in many obscure thyroid conditions. Very young patients, those who are bedfast, and those who must travel long distances to medical centers may be denied isotope studies. In the determination of protein-bound iodine, a simple venipuncture is made on the fasting patient and the sample may be carried to the laboratory or, if necessary, mailed. There obviously are no radiational hazards to technician or patient, and the cost to the patient is much less than for an isotope study, because the test can be performed by laboratory technicians possessing average chemical knowledge and manual dexterity.

In a previous article<sup>5</sup> the Barker method and its adaptability to military medicine was described. Since that time Leffler<sup>6</sup> has published a much simpler procedure, and the method discussed in this report is essentially a modification of that of Leffler. In describing the technic we have listed necessary apparatus and reagents, making use of only the more commonly available laboratory equipment, in order to simplify the procedure for smaller laboratories. Round-bottom, 40-ml centrifuge tubes are used rather than Leffler's flat-bottom tubes, because the latter are costly and difficult to obtain. Substituting round-bottom centrifuge tubes allows use of a standard centrifuge head, obviating the need for special-size trunnion carriers and rings. The rack employed to support the digestion tubes can be fabricated by the technologist from a wire basket and wooden applicator blades. A small standard hot plate is used, rather than a special, large unit not commonly available in small hospital laboratories. Another significant modification is the separate storing of arsenious acid and sodium chloride solutions. If either reagent should

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From Wichita-St. Joseph Hospital, Wichita, Kans., and the Office of the Surgeon General, United States Air Force, Washington 25, D. C.

become contaminated, valuable time is not lost in redoing all titrations. Only one titration is necessary if contamination should occur. In this fashion sensitivity can more easily be adjusted.

Previously reported<sup>1</sup> determinations of protein-bound iodine indicated that such determinations were less valuable in the study of hypothyroidism than in hyperthyroidism. Using the Leffler method, however, we found that the results in hypothyroid conditions are reproducible and valid. Also, for euthyroid persons we did not find the very low normal or subnormal values previously reported. Our normal values are 4.0 to 8.0  $\mu\text{g}$  per 100 ml.

Leffler listed the drugs and medications that interfere with the test: iodine in any form, mercurial diuretics, corticotropin (ACTH) and cortisone, bromides, thiouracil, thiocyanate, sulfonamides, thyroid, and thyroxin. To this list should be added solutions of radioiodine, radiopaque mediums such as Diodrast (brand of iodopyracet), and barium given for gastro-intestinal x-ray studies. The injectable opaque medium contains iodine which is slowly absorbed over a long period of time and will cause an abnormally high value. The barium also contains a small amount of iodine which is rapidly absorbed and causes a similar disturbance. Patients should have blood drawn for determination of protein-bound iodine before undergoing x-ray studies.

The technician performing the test does not have to be isolated from the chemical laboratory. We have found that a section of a hospital clinical laboratory is sufficient provided that iodine-containing chemicals are not used or stored in the immediate area. Ten to 15 samples may be done at the same time. About five hours are required for completion of the test.

The principle of the determination is the catalytic action of iodine on the reduction of colored ceric ion by arsenious acid. O'Neel and Simms<sup>2</sup> gave credit to Chaney for first applying the reaction to biologic materials in 1940.

The six stages in the determination of protein-bound iodine are as follows:

1. *Precipitation of protein.* One milliliter of clear serum is precipitated with 10 ml of 15 per cent trichloroacetic acid.

2. *Washing of protein precipitate.* After initial centrifugation the supernatant trichloroacetic acid is decanted and an additional 10 ml of 15 per cent trichloroacetic acid is used to remove any remaining serum-soluble iodine.

3. *Digestion of protein precipitate.* Ten milliliters of chloric acid reagent is added to the drained protein precipitate. Also added is 1 ml of sodium chromate solution as an indicator. The

mixture in the tubes is digested on an electric hot plate until the volume is reduced to approximately 1 ml and the chromate is oxidized to chromium trioxide.

4. *Reconstitution of digest.* After the formation of the red chromium trioxide the tubes are removed from the hot plate and allowed to cool. Iodine-free water is added to a 10-ml volume and the solution is thoroughly mixed.

5. *Colorimetric determination of iodine.* The ceric sulfate-arsenious acid reaction is applied to the iodine-containing digests, and the catalytic effect of the iodine on the colorimetric reaction is measured during a timed interval.

6. *Plotting of results.* The standard values are plotted on semi-logarithmic paper, and unknown values, in terms of micrograms of iodine per 100 ml of blood, are taken from the resulting graph.

### EQUIPMENT

1. 40-ml round-bottom centrifuge tubes graduated at 10 ml, with one glass bead and a stirring rod in each tube
2. Glass beads
3. 3-mm glass stirring rods
4. Variable temperature electric hot plate
5. Fume hood
6. Pipets:
  - a. 0.5-ml Ostwald
  - b. 1.0-ml Ostwald
  - c. 2.0-ml Ostwald
  - d. 3.0-ml volumetric
  - e. 5.0-ml volumetric
  - f. 10.0-ml volumetric
  - g. 10.0-ml serologic
7. Volumetric flasks:
  - a. 50 ml
  - b. 250 ml
  - c. 500 ml
  - d. 1,000 ml
8. Centrifuge, size 1 or 2, with any head capable of carrying 50-ml shields and rings
9. Assorted large beakers and small flasks
10. Rack or basket capable of holding digestion tubes on the hot plate
11. Spectrophotometer with a 420-m $\mu$  wave length and cuvettes free from scratches
12. Constant-temperature water bath

### PREPARATION OF REAGENTS

All pipets and glassware must be chemically cleaned with dichromate-sulfuric acid solution just prior to use to prevent air-



borne iodine contamination. Rinse thoroughly with hot tap water and then with distilled water. Dry rapidly in a hot-air oven. If any doubt of the quality of the distilled water exists, it is advisable to redistill the water through a glass still with ground glass connections. All reagents must be made from the highest quality chemicals obtainable.

*Trichloroacetic acid (15 per cent).* Dissolve 75 grams of best reagent grade trichloroacetic acid in distilled water to 500 ml in a volumetric flask. Store at room temperature in a pyrex reagent bottle with ground glass stopper.

*Sodium chromate (0.5 per cent).* Dissolve 2.5 grams of sodium chromate in distilled water to 500 ml in a volumetric flask. Store at room temperature in a pyrex reagent bottle.

*Potassium iodate.* (a) *Stock standard (100 gamma per ml).* Dissolve 168.5 mg of potassium iodate in distilled water to a volume of 1,000 ml. The potassium iodate should be dried over calcium chloride in a desiccator for 48 hours before being weighed. (b) *Working standard iodate (0.1 gamma per ml).* Dilute 0.5 ml of the stock standard to 500 ml in a volumetric flask. This working standard should be freshly prepared each time the tests are performed.

*Chloric acid reagent (approximately 28 per cent).* This procedure must be followed exactly! Place 200 grams of crystalline potassium chlorate (Mellinckrodt, analytical reagent) in a chemically cleaned 1,000-ml beaker. Add 360 ml of distilled water and place on an electric hot plate. Heat until dissolved (approximately 30 minutes) with occasional stirring. When solution is complete (the solution will assume a syrupy consistency and will be slightly cloudy), remove from the hot plate and immediately begin addition of 166 ml of 70 per cent perchloric acid, constantly stirring. A slow drip of the perchloric acid is necessary to prevent spattering.

When the addition of the perchloric acid is complete the resulting chloric acid supernatant will be light green in color due to liberated chlorine. Cover the beaker with large filter paper and allow to cool at room temperature for from 15 to 30 minutes, then place the covered beaker in the refrigerator overnight. While the chloric acid is still cold, filter into a 500-ml pyrex reagent bottle through Whatman No. 40 paper. The potassium perchlorate precipitate is immediately washed down the drain with large quantities of hot water. An explosion may result if the precipitate is allowed to stand and reach room temperature or dry out. The yield obtained is approximately 300 ml. Store at room temperature in a dark place. The reagent will rapidly lose the green coloration and become completely clear.

*Stock ceric sulfate.* Place 65 grams of anhydrous ceric sulfate\* in a 1,000-ml beaker. Add 60 ml of concentrated sulfuric acid. Mix and add slowly, with constant stirring, 50 ml of distilled water. Heat at just below the boiling point for 30 minutes. Allow to cool to room temperature, and, while stirring, add distilled water to a volume of about 700 ml. Filter through Whatman No. 40 paper into a pyrex reagent bottle. The working solutions of ceric sulfate are described below.

*Arsenious acid (0.2 normal).* Place 9.89 grams of arsenic trioxide in a 600-ml beaker. Add 70 ml of 10 per cent sodium hydroxide and stir until completely dissolved. Add distilled water to approximately a volume of 400 ml and 5 drops of 0.5 per cent alcoholic solution of phenolphthalein. Slowly add concentrated sulfuric acid until the solution becomes colorless. Add 45 ml of sulfuric acid in excess. Cover beaker and allow to cool. Quantitatively transfer to a 1,000-ml volumetric flask and make up to volume with distilled water. The solution is stored in a pyrex reagent bottle at room temperature.

*Sodium chloride (2 per cent).* Dissolve 5 grams of the highest quality sodium chloride (Mallinckrodt, analytical reagent) in distilled water and bring to 250 ml in a volumetric flask. The volume of sodium chloride solution to be used in the test is given below.

#### TITRATION OF REAGENTS

*Ceric sulfate working solution.* Prepare 5 chemically cleaned test tubes. Into the first tube pipet 3.0 ml of 2 normal sulfuric acid (60 ml sulfuric acid per liter of water) and 2 ml of acid into the 4 remaining tubes. To the first tube add 1.0 ml stock ceric sulfate; mix and make serial dilutions using a 2-ml Ostwald pipet. This gives dilutions from 1:4 to 1:64. Into 5 cuvettes pipet 5.0 ml of 2 normal sulfuric acid and add 1.0 ml of the respective dilutions of ceric sulfate. Read at 420  $\mu$  against distilled water as a blank. Select the dilution that keeps the readings in the most accurate portion of the scale. Once the dilution is determined it is employed in all further titrations and tests.

*Suitability of reagents in combination for the colorimetric reaction.* Into a series of 3 cuvettes pipet the reagents shown in table 1. Mix by gentle lateral shaking and take transmittance readings immediately and at 10, 20, and 30 minutes. The tubes labeled 1 and 2 are read at room temperature at 420  $\mu$  against tube 3, the water blank. A loss of 2 per cent in transmittance is acceptable. Equal loss of color in tubes 1 and 2 shows contamination in the ceric solution. Greater loss of color in tube 1 would indicate contamination of the arsenious acid. A moderately greater loss of color in tube 2 shows water contamination. Example readings are shown in table 1.

\*G. Frederick Smith Chemical Co., Columbus, Ohio.

TABLE 1.

Reagents	Tube 1	Tube 2	Tube 3
	ml	ml	ml
Arsenious acid	2	1	0
Distilled water	3	4	6
Ceric sulfate, working solution	1	1	0
Per cent transmission readings	Tube 1	Tube 2	Tube 3
Immediate	21	21	100
10 minutes	22	22	100
20 minutes	22	22	100
30 minutes	23	23	100

*Titration of sodium chloride solution.* Since all sodium chloride contains traces of iodine the amount present must be titrated. Four cuvettes are employed. Table 2 lists the quantities of reagents in the titration and examples of spectrophotometric readings.

TABLE 2. Sodium chloride titration

Tube number mg NaCl	1 10	2 20	3 40	4 60
	ml	ml	ml	ml
Sodium chloride solution	0.5	1	2	3
Arsenious acid	2	2	2	2
Distilled water	2.5	2	1	0
Ceric sulfate, working solution	1	1	1	1
Per cent transmission readings	Tube 1	Tube 2	Tube 3	Tube 4
Immediate	21	21	21	21
10 minutes	23	27	29	32
20 minutes	24	32	37	39
30 minutes	26	36	47	47

A variation of not over 6 per cent transmission between the immediate and 30-minute readings is allowable. The table indicates that for this particular lot of sodium chloride 10 mg is the optional amount to be used in the determination. This titration must be performed each time a new solution in the colorimetric determination is prepared. Each tube in the following determination will receive 2.0 ml of arsenious acid-sodium chloride reagent. This reagent is prepared by mixing 2.0 ml of arsenious

acid and 0.5 ml of the titrated 2 per cent sodium chloride just prior to use.

### METHOD

Pipet 1.0 ml of serum into the digestion tube and add 10 ml of 15 per cent trichloroacetic acid. Mix by gentle rotation and centrifuge at moderate speed (2,000 r.p.m.) for 10 to 15 minutes to pack the protein precipitate. Decant and discard the supernatant. Wash the precipitate with an additional 10 ml of 15 per cent trichloroacetic acid and recentrifuge to pack the precipitate thoroughly. Decant the supernatant and allow the tube to drain, inverted on a piece of filter paper, while preparing the standards.

Select 4 digestion tubes and label them from 1 to 4. The first tube (blank) is left empty. Pipet 0.5 ml of the working standard into the second, 1.0 ml into the third, and 1.5 ml into the fourth. These contain the equivalent of 5, 10, and 15  $\mu\text{g}$  of iodine per 100 ml of serum.

Into each of the digestion tubes—unknown, standards, and blank—pipet 1.0 ml of 0.5 per cent sodium chromate solution, then 10 ml of chloric acid reagent. Place a glass stirring rod and single glass bead in each tube. Stir the protein precipitate to break it up as finely as possible and leave the stirring rod in each tube. Place all the tubes in the series on the hot plate at low temperature. As a test for the proper temperature, place a strip of bond writing paper on the hot plate; in 30 minutes a slight browning, but no charring, should occur. Close the fume hood and allow the tubes to boil slowly. Care should be taken that the boiling is not too vigorous or that bumping does not occur. Once the temperature is properly adjusted the tubes require no attention for nearly 2 hours. As the volume decreases to approximately 2 ml, constant supervision becomes necessary. The end point of digestion is the formation of a very fine red precipitate of chromium trioxide which appears on the edges of the tube just at the junction with the remaining solution. Preceding the red precipitate formation, moderately dense white fumes will be given off. At the first appearance of the red precipitate the tube is removed from the hot plate and allowed to cool to room temperature inside the fume hood. As the tubes cool the precipitate will become much heavier, leaving a nearly colorless supernatant. If at any time after the first half hour of digestion the yellow chromate color turns to the green of chromium chloride the determination is invalid, as iodine has been lost. After the tubes have cooled add distilled water to the 10-ml graduation. The red precipitate will dissolve and the yellow chromate color will return. Stir the digest thoroughly and allow the tubes to stand for a few moments for the fine granular precipitate to settle.

The iodine content of the digest is determined as follows: In a series of 5 cuvettes place 3 ml of the respective digests. Pipet 6 to 10 ml of distilled water to an unlabeled cuvette; this will be used to set the spectrophotometer at 100 per cent transmission. To each of the numbered cuvettes add 2.0 ml of the arsenious acid-sodium chloride reagent. (The reagent is prepared just prior to use, according to the titration. For example: 2 unknowns, 3 standards, and 1 blank require 12 ml of the reagent. The foregoing titration determined that 10 mg of sodium chloride is required, so one adds 3.0 ml of the 2 per cent sodium chloride solution to 12 ml of the arsenious acid reagent.) The yellow color of the chromate is immediately lost. Mix tubes by gentle lateral rotation and place in a stable water bath at 28°C for 15 minutes. At 30-second intervals, timed with a stop watch, add 1.0 ml of the ceric sulfate working solution to each. Mix with gentle lateral rotation and immediately replace the tube in the water bath. At exactly 10 minutes from the addition of the ceric sulfate to the first tube, start reading the per cent transmittance at 420 m $\mu$  at 30-second intervals in the same order as the ceric sulfate was added. The spectrophotometer is set at 100 per cent

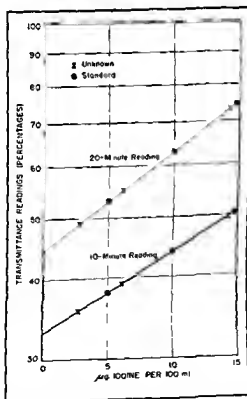


Figure 1. Graph for determining values for protein-bound iodine.

transmittance with the unlabeled cuvette of water as the blank. Record the results. The tubes are immediately replaced in the water bath and a reading is taken again at 20 minutes.

The 10- and 20-minute readings are plotted on semi-logarithmic paper with the concentration of iodine on the abscissa. The resultant standard readings should give nearly a straight line, off which are taken the unknown values. Figure 1 shows typical results.

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#### CHOLESTEROL IN THE ORIENT

Pathologists are still speculating about the possibility that the low blood cholesterol of the Orientals might be a genetic characteristic, like the low weight of adrenals and gonads and the scanty hair growth. Forty years ago, however, Dutch clinicians had already shown that the low-blood cholesterol of the Indonesian is not a racial characteristic. Careful investigation revealed that the blood cholesterol of Javanese serving as well-fed waiters on the luxury ships plying between the Netherlands and the Indies reached levels comparable to the average figures found in the Occident.

—I. SNAPPER, M. D.

in *Annals of the New York Academy of Sciences*  
p. 92, July 15, 1955

# EFFECT OF ACTH ON ACUTE EPIDIDYMITIS

DONALD E. TYLER, *Lieutenant, MC, USNR*  
W. L. SENDERS, *M. D.*

**C**ORTICOSTEROIDS have been used beneficially in selected cases in the treatment of such infectious diseases as tuberculosis, acute rheumatic fever, typhoid fever, brucellosis, rickettsioses, trichinosis, viral hepatitis, mumps orchitis, infectious mononucleosis, and chancroid.<sup>1,2</sup> Florence<sup>3</sup> recently reported an impression that cortisone used in treating five patients with acute epididymitis decreased pain and morbidity and promoted earlier healing. Corticosteroids or corticotropin (ACTH) apparently is not used generally in the treatment of this condition, although trial of such agents in the treatment of the condition appears indicated from theoretic and practical viewpoints.

After the pronounced effect of ACTH on certain features of chancroid was shown by one of us (Tyler),<sup>4</sup> it appeared reasonable that a hyperimmune response on the part of the host also might be responsible for some of the erythema, edema, and destruction of tissue in acute epididymitis. A hyperimmune reaction in this condition is suggested by the appearance of great inflammation and particularly the deep erythema of the overlying scrotum. The frequently observed poor response of this condition to antibiotics might be caused at times by a hyperimmune response. It is also noteworthy that rest in bed and the application of ice bags may give relief in this condition as well as in other diseases probably associated with an excessive host response.<sup>5,6</sup>

Acute epididymitis is a condition that could be greatly benefited by decreasing any destruction of tissue and formation of scars resulting from an excessive host reaction. If the tubules of the epididymis could be spared this damage, a better chance for later passage of sperm through them might result. With the possibility of decreasing the destruction of tissue resulting from excessive host reaction as well as making the patient more comfortable, the effect of ACTH in the treatment of acute epididymitis has been studied in three patients.

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From U. S. S. General J. C. Breckwidge and the Bede and Wark Clinic in Morton, Wash. Or. Tyler is now at the Mayo Foundation, Rochester, Minn.

## CASE REPORTS

**Case 1.** A 21-year-old white man was seen on 4 June 1953 with a painful right gonadal mass of 36 hours' duration without urinary symptoms. Examination revealed an exquisitely tender right testis and epididymis that were together three to four times the normal size; the shape of the enlargement was typical of acute epididymitis. The right side of the scrotum was moderately red.

Although the patient was put to rest in bed during the first 28 hours of treatment, his condition became slightly worse. A total of 80 mg of ACTH was then given intravenously in 1,000 ml of a 5 per cent solution of dextrose in water during 3 hours and ice bags were applied to the genitalia. The pain and tenderness were notably decreased 2 hours later. Doses of 40 mg of ACTH were given in a similar manner the next morning and again the next afternoon. That evening the scrotum was less red and the testis and epididymis were much less tender. Gradual improvement occurred for the next five days, at which time the mass was still slightly tender and approximately three times the size of the left testis. Another dose of 40 mg of ACTH was given as before, and on the following morning the gonad was nontender and was softer and smaller than it had been on the previous day. The patient was then given 1 gram of Aureomycin (brand of chlortetracycline hydrochloride) four times daily for four days.

Seventeen days after the onset, the epididymis apparently was normal and the patient was returned to duty. The right testis remained one and a half times the size of the left but was normal in consistency and tenderness. The same conditions prevailed two months later.

**Case 2.** A 33-year-old white man was seen on 12 June 1953, because of pain in the left testis of four hours' duration and frequency and urgency of urination for two or three days. At this time, the only finding was moderate tenderness in the epididymis. Administration of 500 mg of Terramycin (brand of oxytetracycline) four times daily, was started. The epididymis was enlarged the next day to the size of the testis and was irregular in shape and extremely tender. The dose of terramycin was increased to 1 gram four times daily, and rest in bed was instituted. The following afternoon, 40 mg of ACTH was given slowly as an intravenous drip. Seven hours after this infusion was started, the condition of the epididymis was greatly improved; it was estimated by the patient to be only half as tender as it was at the start of the infusion.

Gradual improvement took place during the next five days. Because the epididymis was still enlarged and slightly tender, the patient was transferred to a service hospital and further follow-up was not possible.

**Case 3.** A 35-year-old white man was seen on 1 March 1954, with a painful scrotal swelling of three days' duration, associated with fever and malaise. Two hundred and forty mg (400,000 units) of penicillin and 0.5 gram of dihydrostreptomycin were given twice daily. After 2



days with no improvement, the patient was hospitalized. Examination at this time revealed exquisite tenderness of the testis and epididymis, with enlargement to four to five times normal size and deep erythema of the overlying scrotum. Two days of rest in bed, further administration of penicillin and dihydrostreptomycin, and local application of ice bags resulted in no essential change, the patient remaining febrile.

The next day, which was 6 March, the temperature was 100.4°F at 0800 hours and the tender gonadal mass appeared essentially the same as at admission. Twenty units of ACTH gel was administered intramuscularly at 1000 hours. Five hours later, the patient was comfortable for the first time since his admission and his temperature was normal. ACTH was given in a similar manner twice daily for a total of two days. The mass decreased progressively in size after the first injection and the patient was able to return to work on March 8.

### SUMMARY

Administration of ACTH in three patients with acute epididymitis caused a decrease in local tenderness, swelling, and erythema. Such treatment probably increases the possibility of maintaining tubular patency by decreasing local destruction of tissue and fibrosis. Because ACTH decreases the patient's discomfort and probably lowers his chance of becoming sterile, further trial of this steroid in the treatment of patients with acute epididymitis is indicated. It is probably advisable to use the preferred antibiotics in conjunction with ACTH in the treatment of this disease.

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"Treatment of functional gastrointestinal disturbances rests fundamentally on the art of medicine in the treatment of the patient and not on the science of medicine in the treatment of the disease."

—O. L. WILBUR, M. D.  
in *The Journal of the American Medical Association*, p. 854, June 30, 1956

# VARIABILITY OF PSYCHIATRIC DIAGNOSES

JACK V. WALLINGA, *Lieutenant Commander, MC, USNR*

**P**REVIOUS to World War II, the emphasis in psychiatry was primarily on diagnostic differentiation. Recent interest has been focused more on dynamic understanding, psychotherapy, and lately, chemotherapy. In many clinical settings, however, a considerable amount of time and effort is still expended on diagnostic evaluation and classification. This is especially true in military psychiatry where large numbers of patients must be evaluated quickly and transferred to other facilities for more extensive treatment or disposition, as well as in many civilian clinics and hospitals where patient needs far exceed available staff time and brief diagnostic studies frequently are all that can be offered.

In re-evaluating admissions to the large psychiatric service of this hospital, the question of reliability of the diagnoses arose in view of the contradictory nature of successive psychiatric diagnoses assigned to a given patient. In determining the amount or type of therapy indicated, frequent and often excessive concern about a statistical rather than a clinical type of diagnosis was observed, as was the undue reliance frequently placed on the diagnostic label rather than on the patient's individual history and personality resources.

## STATISTICAL DATA

This study is based on 804 Navy and Marine Corps patients who represented all admissions with a psychiatric diagnosis to the neuropsychiatric service of this hospital during the 10-month period from 1 May 1954 to 1 March 1955. Not included were patients with neurologic diagnoses only.

Two hundred and sixty-four patients (32.8 per cent) were either directly admitted to this hospital or were transferred here from another nonpsychiatric facility (table 1). The remaining 540 (67.2 per cent) previously had been admitted to or evaluated by other medical facilities staffed by qualified psychiatrists, in the course of their present psychiatric illness and before transfer to this hospital. On admission to the sick list, a tentative diagnosis or diagnostic impression may be recorded, *e. g.*, diagnosis undetermined (anxiety reaction); or an established diagnosis may be made (*Joint Armed Services Nomenclature and Method of Re-*

according *Psychiatric Conditions*, Washington, D. C., June 1944). These diagnoses may be changed any time during the course of hospitalization. We are particularly interested here in these changes and the reasons for them.

TABLE 1. *Source of psychiatric patients*

Patients	Per cent	Number
Admitted from other psychiatric facilities		540
One psychiatric diagnosis	36	194
More than one psychiatric diagnosis	65	346
Admitted direct*		264
One psychiatric diagnosis	53	140
More than one psychiatric diagnosis	47	124

\*Not from or via a medical facility with qualified psychiatric staff.

Of the 804 patients studied, 470 (58.5 per cent) received more than one psychiatric diagnosis during the present illness; only 149 of these represent cases in which the subsequent diagnosis was changed from an initially uncertain or tentative diagnostic impression. In the remaining 321 cases, the diagnosis appeared definite enough initially to be recorded as established, suggesting clinical certainty. Actually, of the 1,012 psychiatric diagnoses given to this group of 470 patients, only 151 were recorded as tentative. Sixteen patients, during their "single" illness, received diagnoses from all three categories—psychosis, neurosis, and personality disorder.

From table 1, it is observed that patients who were seen at only one psychiatric facility, and so presumably by fewer psychiatrists, are more likely to retain a single diagnosis.

In further evaluating the 470 patients whose psychiatric diagnoses were changed during the course of their illness, it was found that the diagnosis in 38 patients was changed from a tentative diagnostic impression to a different established diagnosis but one within the same area of disturbance, for example, from DU (manic-depressive reaction) to schizophrenic reaction, paranoid type—both psychotic disorders. The diagnosis in 124 patients was changed from an impression in one area to an established diagnosis in another area, *e. g.*, DU (manic-depressive reaction) to anxiety reaction. Seventy were changed from established diagnoses to different established diagnoses but in the same area, such as manic-depressive reaction to schizophrenic reaction, paranoid type. Two hundred and fifty-one were changed from established diagnoses in one area to established diagnoses in another area, *e. g.*, manic-depressive reaction to anxiety reaction.

The same inconsistency in psychiatric diagnosis is found in the patients studied who, within the previous 2 years, had received psychiatric diagnoses from either military or civilian facilities. Of the 334 patients with only 1 psychiatric diagnosis in their present illness, 60 had previous psychiatric contacts recorded; 43 of these contacts occurred within the 2 years preceding the present hospitalization, and the previous diagnosis was known. Of these 43 patients, 26 (60.5 per cent) had received a different psychiatric diagnosis on that previous occasion, and 17 received the same diagnosis as in this hospitalization. Seventy-seven of the 470 patients with multiple psychiatric diagnoses had been seen previously for psychiatric reasons; 57 who had been seen within the previous 2 years received a psychiatric diagnosis which was known; of these, 32 (56.1 per cent) had been given a different diagnosis before, and 25 the same as in this admission.

It was thought there might be certain logical patterns of change in the clinical course of these patients' illnesses that would be reflected in diagnostic changes. For instance, severe, acute anxiety and paniclike reactions might initially appear to be of psychotic proportion, only to resolve later into a more typical neurotic pattern after the patient was removed from the emotionally traumatic situation; or patients being evacuated from forward areas might be diagnosed as more severely disturbed than was warranted, perhaps to justify, either clinically or administratively, their prompt transfer by air. Such patterns were not statistically prominent (table 2). From this table it is seen that a change from a diagnosis of one neurosis to that of another is least common (1.9 per cent). Changes from a diagnosis of psychosis or character disorder to that of neurosis are also infrequent, totaling only 12.4 per cent of all diagnostic changes. On the other hand, diagnostic changes from one psychosis to another or from a psychosis to a character disorder are most prevalent, and together represent nearly one third of all changes, suggesting that either our concept of the psychosis is less well defined or the illness as observed in this group is of a more transient nature than are the neuroses. Changes of diagnosis between psychosis and character disorder comprise 26.1 per cent of the total and may indicate a relationship between the two categories or reflect particular diagnostic uncertainty in these groups.

Diagnostic differentiation by age groups is shown in table 3. In age differentiation it is noted that while the proportion of psychoses remains essentially unchanged, there are many more neurotic illnesses in the older group and a correspondingly high incidence of character disorders in the young, recently enlisted group. It might be anticipated that long-standing personality disorders would become apparent during the first few years of serv-

*ording Psychiatric Conditions*, Washington, D. C., June 1944). These diagnoses may be changed any time during the course of hospitalization. We are particularly interested here in these changes and the reasons for them.

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In further evaluating the 470 patients whose psychiatric diagnoses were changed during the course of their illness, it was found that the diagnosis in 38 patients was changed from a tentative diagnostic impression to a different established diagnosis but one within the same area of disturbance, for example, from DU (manic-depressive reaction) to schizophrenic reaction, paranoid type—both psychotic disorders. The diagnosis in 124 patients was changed from an impression in one area to an established diagnosis in another area, *e. g.*, DU (manic-depressive reaction) to anxiety reaction. Seventy were changed from established diagnoses to different established diagnoses but in the same area, such as manic-depressive reaction to schizophrenic reaction, paranoid type. Two hundred and fifty-one were changed from established diagnoses in one area to established diagnoses in another area, *e. g.*, manic-depressive reaction to anxiety reaction.

TABLE 4. Final diagnosis

Diagnosis		Total
<b>Psychotic disorders</b>		
Schizophrenic reaction, n. e. o. (300)	100*	
Schizophrenic reaction, paranoid type (301)	10*	
Schizophrenic reaction, catatonic type (302)	10*	
Manic-depressive reaction (303)	10*	
Schizophrenic reaction, latent (304)	10*	
Psychotic depressive reaction (305)	10*	
Schizophrenic reaction, simple type (306)	10*	
Psychotic disorders with physical etiology (307)	10*	
Involuntary melancholia (308)	10*	
Schizophrenic reaction, hebephrenic type (309)	10*	
Paranoid state (310)	10*	
<b>Nonpsychotic disorders with physical causes (311)</b>		
<b>Psychoneurotic disorders</b>		
Anxiety reaction (310)	50*	
Neurotic depressive reaction (310)	10*	
Somatization reactions	10*	
Dissociative reaction (311)	10*	
Conversion reaction (312)	5	
Obsessive compulsive reaction (313)	4	
Phobic reaction (312)	1	
Hypochondriacal reaction (313)	1	
<b>Character and behavior patterns</b>		
Emotional instability reaction (3210)	76*	
Schizoid personality (3200)	64*	
Inadequate personality (3203)	32*	
Passive dependency reaction (3211)	32*	
Passive aggressive reaction (3212)	24*	
Aggressive reaction (3213)	15	
Paranoid personality (3201)	8	
Immaturity with symptomatic habit reaction (3215)	8	
Alcoholism (3221)	6	
Antisocial personality (3204)	4	
Cyclothymic personality (3202)	3	
Primary childhood behavior reaction (3240)	3	
Asocial personality (3205)	1	
Acute situational maladjustment (3274)	50*	50
Mental deficiency (primary) (3250)	2	2
Total		797

\*The 14 diagnostic categories accounting for 88 per cent of all the cases

ice, while neuroses—often due to service experiences themselves—would appear later.

TABLE 2. *Patterns of diagnostic change*

Group	Initial impression or diagnosis of	Changed to	Number	Per cent
A	Neurosis	Character disorder	68	11.6
B	Neurosis	Psychosis	63	10.9
C	Neurosis	Another neurosis	11	1.9
D	Psychosis	Character disorder	82	14.0
E	Psychosis	Neurosis	39	6.6
F	Psychosis	Another psychosis	94	16.0
G	Character disorder	Neurosis	34	5.8
H	Character disorder	Psychosis	71	12.1
I	Character disorder	Another character disorder	52	8.9
J	Situational maladjustment	Other psychiatric diagnoses	24	4.0
K	Other psychiatric diagnoses	Acute situational maladjustment	37	6.3
L	Changes involving nonpsychotic disorders with demonstrable physical causes	Other psychiatric diagnoses	11	1.9
Total			586	100.0

TABLE 3. *Diagnostic distribution by age groups*

Final diagnostic group	Age of patients (years)	
	17 through 24	25 and over
Psychotic	179	83
Neurotic	81	107
Character disorder	237	37
Acute situational maladjustment	16	35
Total	513	262

The distribution of final diagnoses, shown in table 4, is of interest. In this table it can be seen that the most common final diagnosis is schizophrenic reaction, not elsewhere classified (n. e. c.), which accounts for 15.4 per cent of all of the final diagnoses and almost half (46.4 per cent) of the diagnoses of psychosis. Thus, after lengthy observation and evaluation, the final diagnosis in this large group of cases did not fit a clearly de-

differ diagnostically even though their own contacts with a patient suggest that he is not as disturbed as his diagnosis indicates. It has been observed here that the diagnosis influences, to a certain extent, the patient's clinical behavior. When some patients are diagnosed as psychotic, this provides them with tacit permission to lose control and act psychotic. A psychotic diagnosis leads to closer confinement, less ego control is expected of the patient, and so less conformity is demanded of him by the staff, often by his family, and, therefore, by himself. On the other hand, a disturbed patient who is given increased freedom and individual responsibility is very often seen to meet this with improved behavioral control and decreased "sick" behavior—often shortening his period of hospitalization.

The patient almost invariably learns his diagnosis and, again, is frequently upset about it because of popular concepts of various psychiatric disturbances. He commonly reads up on his illness when books are available, or communicates his psychiatric label to his family, who become emotionally upset—more over the connotations and implications of the psychiatric diagnosis than over the patient's actual condition. Such anxiety at home is usually conveyed back to the patient, contributing noticeably to his feelings of guilt, failure, and inadequacy about being disabled with an emotional illness.

In addition to differences of diagnostic opinion because of varied backgrounds and training, physicians cannot help but reflect their own feelings and biases through the diagnoses they make in a field such as psychiatry where objective findings are more difficult to determine. For example, one who is enthusiastic about the treatment of schizophrenia may unconsciously be too liberal in his use of this diagnosis. His confidence in his therapeutic success will then be strengthened by the cures he effects. On the other hand, marked pessimism about the prognosis of a particular diagnostic entity may lead to reluctance to place any patient in that category. Some patients may earn a particularly harsh or punitive diagnosis by arousing strong negative countertransference feelings in the physician by an unco-operatively defiant, belligerent, or aggressive attitude.

The diagnostic nomenclature used at present reflects essentially the primary ego defense structure used by the patient—a pattern which is abnormal and identifiable. As this attempt to deal with reality is not adequate, the symptomatic pattern is not static or fixed, especially in the acute phase of the emotional disturbance. Instead, we may find the patient handling his feelings in many different ways with varied clinical pictures and diagnoses resulting, depending on when the diagnostic evaluation was carried out. It should be noted that although the psychiatric diagnoses were often at wide variance, recommendations for treat-



finer category. Fourteen diagnostic categories account for 88 per cent of all cases. Some diagnoses were not used at all in this group of patients, although they undoubtedly serve a useful purpose under other circumstances.

### DISCUSSION

Psychiatric diagnoses are undoubtedly influenced by factors other than the patients' clinical picture, such as the medical officer's training and experience with psychiatric illnesses, his attitudes and personal needs in relation to psychiatric patients and specific psychiatric disorders, and, not least, administrative demands. These factors deserve consideration in view of the amount of time and effort which is still being expended to establish diagnoses which often confuse rather than clarify the clinical picture.

An initial, "established" diagnosis may be made by a person psychiatrically inexperienced or unqualified. This diagnosis becomes a part of the patient's health record and accompanies him throughout his hospitalization. When transferred to a different medical facility, his record is often given more weight than his clinical picture, at least until sufficient time has elapsed for the staff to become well acquainted with the patient, re-evaluate him, and then perhaps change his diagnosis. Strong reluctance to change a diagnosis was often encountered on the basis that the patient was "entitled" to his most severe psychiatric diagnosis for the purpose of evaluating suitability for return to duty or disability rating. At times, extensive clinical contact, social service investigation, and psychologic evaluation were required to confirm or disprove a diagnosis previously established with inadequate clinical substantiation.

Situational or administrative demands may lead to a more severe diagnosis than the patient's clinical condition actually warrants in order to emphasize a need for prompt evacuation from a forward area. Although in such cases the diagnosis serves its administrative purpose, it may subsequently have an adverse effect on the patient's psychiatric management. This is more likely to occur in psychiatry where diagnostic labels carry strong, popular connotations—for example, an insecure, anxious, neurotic patient receiving an initial diagnosis or even impression of schizophrenia would probably be treated as psychotic until subsequently re-evaluated. In the meantime, he might well be transferred in restraints and confined to a locked psychiatric ward where the staff attitude of detached indifference to his requests, such as is too often shown psychotic patients, would not only fail to meet his emotional needs but might increase his anxiety manifold.

At times, the doctor's diagnostic ability assumes a "magical" quality, and nurses and corps staff are not readily inclined to

# EFFECT OF MOTHERS' ABO BLOOD GROUP ON ISOANTIBODY

## Levels of Group O Children

CHARLES B. KENNEL, *Second Lieutenant, MSC, USA*  
LOUIS H. MUSCHEL, *Major, MSC, USA*

THE POSSIBILITY that the Rh<sub>0</sub> blood type in the maternal grandmother may influence the occurrence of hemolytic disease of a newborn infant and the production of anti-Rh<sub>0</sub> in the mother has been considered by various authors. In the rare cases of hemolytic disease of the first-born, unassociated with previous transfusions, Beasley<sup>1</sup> made the suggestion that such mothers may have been immunized *in utero* by Rh<sub>0</sub> antigen from their mothers. Although the embryo is probably a poor antibody producer, it is conceivable that the gestation of Rh<sub>0</sub>-negative fetuses in Rh<sub>0</sub>-positive mothers might sensitize the fetus so that during subsequent childbearing years a typically marked secondary response might occur.

On the other hand, the work of Billingham, Brent, and Medawar<sup>2</sup> showed that early sensitization of an embryo with foreign tissue renders the mature form of the organism less resistant to later transplant of that tissue. This finding is generally explained on a serologic basis. Exposure of an organism to an antigen at a very early stage in its development is presumed to render the organism incapable of producing antibodies to that antigen at a later time. These antibodies may inhibit a successful transplant. It would appear that the mature organism does not recognize the antigen as a foreign substance as a result of its early exposure. In accord with this concept, Hanan and Oyama<sup>3</sup> showed that rabbits subjected to bovine serum albumin *in utero* and shortly after birth failed to develop antibody to that antigen when full grown. If this principle is applicable to the Rh system, then hemolytic disease of the newborn infant, attributable to the Rh<sub>0</sub> factor, would be more prevalent in infants whose maternal grandmothers were Rh<sub>0</sub> negative. On the other hand, if hemolytic disease were more prevalent in newborn infants whose maternal grandmothers were Rh<sub>0</sub> positive, then Beasley's suggestion would agree with the observations.

ment or discharge from the service were in much better agreement throughout successive psychiatric evaluations.

From the impressions gained in this study the possibility occurred that a less specific diagnostic classification system might serve to expedite and clarify the clinical care of psychiatric patients, in civilian as well as in military situations, where large numbers of patients are seen by different physicians and a brief evaluation is required preparatory to intensive therapy or evaluation elsewhere. It was considered that a classification initially concerned more with tentative clinical features—*i. e.*, the degree of emotional disturbance, whether mild, moderate, or severe; acuteness or chronicity of the illness; and self-destructive or aggressive tendencies—would be of primary value and allow wider flexibility in the subsequent clinical handling of the patient. This would permit deferral of an assignment of a precise psychiatric label until the patient was nearer the completion of treatment and final disposition. It is recognized, however, that such a procedure might not meet the administrative demands of existing retirement and compensation programs for such patients.

#### SUMMARY

A study of the changes of diagnoses of 804 psychiatric patients is presented. Patients seen at more than one psychiatrically staffed medical facility were found more likely to have a change of diagnosis. Diagnoses of psychoses and character disorders were more often involved in these diagnostic changes than those of neuroses.

Psychiatric diagnoses by different medical officers were frequently found to be in disagreement. The differences may be due to several factors: varied backgrounds of training and experience, different demands of the immediate administrative situation, the emotional needs of the physicians as reflected in their use of some diagnostic categories, and changing clinical pictures in acutely disturbed patients. Not infrequently, a majority of the diagnoses assigned are inappropriate and require subsequent modification. Meanwhile they tend to confuse the clinical picture, and often are detrimental to the patient by adversely influencing those who care for him or by increasing his discomfort and anxiety because of popular connotations which accompany classical psychiatric diagnostic concepts. The marked variability of psychiatric diagnoses assigned to the patients studied suggests that the clinical handling of acute psychiatric patients might be simplified in several ways by the initial use of a more tentative, descriptive, and less specifically psychiatric label. A formal diagnosis for classification and administrative purposes might then be reserved until later in the course of the patient's hospitalization when the clinical picture is more stabilized.

were separated from the blood and stored at  $-20^{\circ}\text{C}$  until tested. Blood specimens were also obtained from the mothers of the children and their blood group determined. Information concerning the age and immunization status of each child was obtained from records at the high schools. Tests were performed on the children's sera for the determination of the levels of saline isoagglutinins, so-called immune isoagglutinins, and isohemolysins.

**Saline Isoagglutinins.** The sera were diluted in two-thirds fold steps in saline in duplicate. The dilutions ranged from 1:8 to 1:307. One-tenth milliliter of a 2 per cent suspension in saline of fresh human red cells of group A<sub>1</sub> was added to each dilution, and the same quantity of group B red cells added to the other set of dilutions. The tubes were incubated at room temperature for one hour, centrifuged for one minute at 500 G, and read with the aid of a microscope mirror.

**Immune Isoagglutinins.** To 0.1 ml of undiluted test serum, 0.3 ml of soluble group specific substances A and B was added. This step effects a partial neutralization of the saline isoagglutinins. The mixtures were incubated at room temperature for one hour, and then 0.4 ml of group AB plasma was added, which resulted in a 1:8 dilution. Further serial dilutions were made as in the tests for saline agglutinins except that AB plasma was used as the diluent for both the test sera and red cell suspensions. The tubes were incubated at  $37^{\circ}\text{C}$  for one hour prior to centrifugation, and examinations were performed with the aid of a microscope mirror as in the tests for saline isoagglutinins.

**Isohemolysins.** These determinations were made with foreign complement according to the method of McDermott and Muschel,<sup>6</sup> which involves the lysis of appropriate red cells by inactivated test sera plus human serum as a complement source. To 0.1 ml of heat-inactivated test serum ( $56^{\circ}\text{C}$  for 30 minutes), 0.1 ml of a 5 per cent saline suspension of group A<sub>1</sub> red cells was added. Another tube was similarly prepared with group B red cells in place of the A<sub>1</sub> red cells. Then, as a complement source, 0.1 ml of fresh serum of a group O individual, containing little or no anti-A or anti-B hemolytic activity, was added to both tubes. Appropriate control tubes were also included. All tubes were incubated at  $37^{\circ}\text{C}$  for one hour and read by eye estimate. Fifty per cent hemolysis was scored as a 2 plus reaction.

## RESULTS

The results of the various determinations grouped according to the blood group of the mothers are given in tables 1 and 2. In the first group of children (table 1), analysis by the ranking test for the agglutinins and by the chi-square test for the hemolysins<sup>9</sup> did not indicate any significant differences in any o

Recently, facts have been gathered in an attempt to answer that question. Booth and co-workers<sup>4</sup> tested 113 maternal grandmothers of children with hemolytic disease caused by anti-Rh<sub>0</sub>. They found that the number of grandmothers with Rh<sub>0</sub>-positive and Rh<sub>0</sub>-negative factors was exactly that expected of mothers of Rh<sub>0</sub>-negative persons. Owen and associates<sup>5</sup> extended these observations and presented statistical evidence that the tendency for a woman to develop anti-Rh<sub>0</sub> factors in an early Rh<sub>0</sub>-positive pregnancy is greater among Rh<sub>0</sub>-negative daughters whose mothers are Rh<sub>0</sub> negative than among those whose mothers are Rh<sub>0</sub> positive. On the other hand, in agreement with the findings of Booth and his group, the relationship is obscure when a classification is attempted on the basis of hemolytic disease of the newborn. Owen's group suggested that the kind or amount of antibody produced in early Rh<sub>0</sub>-positive pregnancies by Rh<sub>0</sub>-negative women whose mothers are Rh<sub>0</sub> negative is such as to permit a considerable portion of the infants to escape clinically evident disease.

The question was then raised concerning the applicability of the principle of inhibition of antibody formation by early exposure to an antigen of the ABO system. In contrast to the lack of readily demonstrable water-soluble Rh substance, the A and B substances occur in water-soluble form in most of the body fluids and organs of most persons.<sup>6</sup> Thus, one would suspect that the principle, that early exposure to an antigen prevents a subsequent antibody formation against that antigen, is, at least, as applicable to the ABO system as to the Rh system.

The possibility that the marked variations in the titer of the blood group isoantibodies among different persons are influenced by the maternal blood group was considered worthy of investigation at this laboratory for various reasons. The titer and characteristics of the blood group isoantibodies are of great significance in the use of blood of persons of group O in transfusion to persons of other groups and in the cause of hemolytic disease of the newborn infant attributable to the ABO system. The latter has been restricted largely to mothers of group O,<sup>7</sup> and our study was limited, therefore, to children of group O. Serologic tests were done on these children's sera to determine the levels of the so-called natural and immune isoantibodies. Natural isoantibodies are characterized by reactivity in saline and are neutralized by the group specific substances. Immune isoantibodies are not neutralized by the group specific substances and require a medium of high colloidal concentration for their demonstration. They are also capable of lysing red cells.

#### MATERIALS AND METHODS

Blood specimens were obtained from 137 children of blood group O in two U. S. Forces high schools in the Far East. Sera

were separated from the blood and stored at  $-20^{\circ}\text{C}$  until tested. Blood specimens were also obtained from the mothers of the children and their blood group determined. Information concerning the age and immunization status of each child was obtained from records at the high schools. Tests were performed on the children's sera for the determination of the levels of saline isoagglutinins, so-called immune isoagglutinins, and isohemolysins.

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TABLE 1. Results of isoelectric tests of group O children from Tokyo Grant Heights School with blood group															Geometric mean					
Mothers' group	No. of children	Neg. at 1:8	Titers (1: )										307.5							
			8	12	18	27	40.5	60.8	91.1	136.7	205.0									
a. Saline isoelectric tests																				
A	7	0	0	0	0	0	0	1*	2	3	1	0	0	114.8						
B	3	0	0	0	0	2	0	0	0	0	0	1	1	79.4						
O	70	0	0	1	3	10	11	6	17	8	13	0	0	104.7						
b. Immune isoelectric tests																				
A	7	0	0	0	0	0	0	1	3	2	1	0	0	108.6						
B	3	0	0	1	0	1	0	1	0	0	0	0	0	40.5						
O	70	0	5	0	10	11	11	8	12	5	8	0	0	71.5						
c. Isohemolysin tests																				
anti-A titers																				
A	7	0	0	1	0	1	0	1	1	3	0	0	0	64.6						
B	3	0	0	1	0	0	0	1	0	0	0	1	1	60.8						
O	42	2	0	2	1	3	2	5	4	6	11	0	0	94.4						
anti-B titers																				
A	7	1	0	2	0	0	0	1	0	0	0	1	1	23.1						
B	3	3	0	0	0	0	0	0	0	0	0	0	0	4.0						
O	42	12	2	4	2	8	3	6	1	2	0	2	2	19.3						
anti-B reactions																				
anti-A reactions																				
Mothers' group			No. of children			Less than 2+			2+ or greater			Mothers' group			Less than 2+			2+ or greater		
A			7			7			0			A			7			0		
B			3			3			0			B			3			0		
O			42			32			10			O			42			2		

\*Indicates number of sera positive at a particular dilution

TABLE 2. Results of isoantibody tests of group O children from a Yokohama school arranged according to their mothers' blood group

Mothers' group		No. of children	Neg. at 1:8		Titers (1: )								Geometric mean	
			8	12	18	27	40.5	60.8	91.1	136.7	205.0	307.5		
a. Saline isoagglutinins														
anti-A titers														
A	10	0	0	0	0	0	0	1	2	3	1	3	154.9	
B	8	0	0	1	0	0	0	1	4	1	1	0	78.3	
O	39	0	0	0	1	0	3	4	3	6	8	14	153.5	
anti-B titers														
A	10	0	0	2	0	0	0	3	2	2	1	0	63.2	
B	8	0	1	1	0	0	2	1	1	1	1	0	47.2	
O	39	0	4	2	2	7	3	8	5	2	4	2	48.3	
b. Immune isoagglutinins														
anti-A titers														
A	10	5	1	1	0	1	0	1	0	0	0	1	11.7	
B	8	5	0	0	0	2	1	0	0	0	0	0	8.6	
O	39	16	1	9	2	4	1	4	0	2	0	0	11.5	
anti-B titers														
A	10	1	0	0	0	4	1	0	2	0	0	2	48.2	
B	8	0	0	1	0	1	1	1	0	2	1	1	74.6	
O	39	4	0	7	1	6	0	9	3	4	0	5	40.6	
c. Isohemolysin tests														
anti-A reactions														
Mothers' group		No. of children	Less than 2+		2+ or greater									
A	10	10	7	18	3	5	10	5	5	17				
B	8	8	7	7	1	5	8	5	3	3				
O	39	39	18	21	21	22	39	22	17	17				



the determinations between children of blood group O mothers as compared with children of blood group A mothers. The three children of group B mothers were too small in number for consideration. In the second group of children tested (table 2), the only comparison which reached a significant difference at the 5 per cent level was the low titers of the anti-A saline isoagglutinins and isohemolysins in the children of group B mothers compared with those in children of O mothers. The reason for this difference is not evident. The relatively high anti-B immune isoagglutinin level of the children of group B mothers is noteworthy, but also unexplained. Other variables such as the sex of the children and their age did not exert a significant effect and are not shown. All the children received the same prophylactic immunizations against typhoid, tetanus, typhus, and smallpox at approximately the same time, and, therefore, that factor was probably of little consequence.

### DISCUSSION AND SUMMARY

The reason for the wide variation in the isoantibody titers in normal children of blood group O presents a challenging problem. The observations indicating the significance of the maternal Rh<sub>0</sub> type in the development of anti-Rh<sub>0</sub> antibodies suggested that a similar relationship might exist between the maternal blood group and blood group isoantibody development. Accordingly the blood group isoantibody levels of children of high school age was determined and the results classified according to their mothers' blood group. The experiments were designed to test a single point, whether or not the maternal blood group influenced the blood group isoantibody levels. The results indicated that the maternal blood group is not an important factor in influencing isoantibody levels. For example, 17 group O children of mothers of group A had anti-A immune isoagglutinin titers ranging from 1:12 to 1:307.5.

Furuhata and Matsunaga<sup>12</sup> have suggested that the isoagglutinin titer level tends to be hereditarily determined and that simple Mendelian laws are applicable. It seems likely that a host of other factors also influence the isoagglutinin response in a given person. Chances contacts with A- or B-like substances, hormonal factors, protein synthetic ability, and all the other unknown factors which contribute to antibody synthesis probably play a role.

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### "MINISTERS OF DEATH"

It appeared to me that in a matter with which the mind of the profession is at present so much occupied, something ought to be said. . . . I accordingly prepared an article on Anaesthetics in which, while I have tried to do justice to a class of remedies, the introduction of which into practice is, I firmly believe, a great boon to which, into practice in the particular department of the healing arts to which I have devoted most of my time, enables us to rob labor of half its sorrows and almost all its terrors; I have at the same time, and even with more earnest efforts, labored to impress on the minds of those as yet unfamiliar with their use, the lessons of caution and watchfulness without which I know these agents are and must be ministers of death.

—DR. C. R. GILMAN:  
written in 1851 and quoted by  
—PRESTON J. BURNHAM, M. D.  
in *Anesthesiology*  
p. 544, Sept. 1954

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IX

# MAJOR BLOOD GROUPS IN KOREANS

SARKIS S. SARKISIAN, *Commander, MC, USN*

**A**N OPPORTUNITY to record major blood groups and Rh. types in the South Korean population occurred in 1954 as part of the program of Armed Forces Assistance to Korea. The survey included 588 males and 412 females from the civilian population of an area about 20 miles north of Seoul, Korea. Korean medical officers were encouraged to participate in order to become familiar with whole blood banking procedures.

Oxalated whole blood was tested with ABO grouping and Rh. typing sera. A complicating feature that constantly recurred was the persistent anemia of most Koreans. This probably had resulted from a combination of poor diet and parasitic infestation. The average hemoglobin was found to be 9.5 g per 100 ml of blood (Haden-Hausser method). This, coupled with the relatively small size of the Korean (average weight: 50 kg), resulted in the decision to use a standard blood unit of 350 ml for transfusion and banking procedures.

## RESULTS AND DISCUSSION

The findings, tabulated in table 1, are in agreement with information reported by other investigators, as listed by Wiener.<sup>1</sup> The blood group distribution for Koreans approximates that reported for Northern India, where Cappell<sup>2</sup> found the following distribution: Group O, 28.8 per cent; Group A, 28.0 per cent; Group B, 33.0 per cent; and Group AB, 10.2 per cent. All of the 1,000 Koreans tested were Rh.-positive, a finding comparable to those reported for Brazilian Indians<sup>3</sup> and Japanese.<sup>4</sup> In the latter, the Rh.-negative bloods fall within the range of from 0.3 to 1.3 per cent.

As compared with the present survey, Boyd<sup>5</sup> found a blood-group distribution for Koreans having a reversed value of Group O and A incidence. This may be partially explained on the basis of typing serum potency (table 1). Hooper<sup>6</sup> compiled figures for racial blood groupings in various geographic locations as indicated in table 2. The Sino-Japanese blood group percentages that he listed are comparable to those found in Korea. On the other hand, when the Rh. type is considered as a comparative item, it is noted that Koreans and American Indians are 100 per cent Rh.-positive, whereas their blood groups do not coincide.<sup>7</sup>

From U. S. Naval Hospital, St. Albans, N. Y.

TABLE 1. *Racial distribution of blood groups*

Nationality	Group O (per cent)	Group A (per cent)	Group B (per cent)	Group AB (per cent)
Koreans (this survey)	27	32	29	12
Koreans (Boyd <sup>5</sup> )	32	27	29	12
U. S. population (Schiff and Boyd <sup>8</sup> )	40	40	15	5
Icelanders (Donegani et al. <sup>11</sup> )	55	32	11	2
Borneo (Graydon et al. <sup>12</sup> )	35	29	27	9
Egyptians (Gohar <sup>13</sup> )	30	34	25	11
New Zealanders (Staveley and Godley <sup>14</sup> )	54	35	8	3
Navahos (Boyd and Boyd <sup>7</sup> )	77	23	0	0
Sino-Japanese (Hooper <sup>6</sup> )	38	22	27	13
All races (Hooper <sup>6</sup> )	40	35	20	5

TABLE 2. *Racial and geographic distribution of blood groups (from Hooper<sup>6</sup>)*

Nationality	Groups (per cent)			
	O	A	B	AB
All races	40	35	20	5
Europe and America	39	43	12	6
Sino-Japanese	38	22	27	13
Irish	53	33	11	3

Table 3 lists for comparison the findings of Schiff and Boyd,<sup>8</sup> Snyder,<sup>9</sup> and Barton,<sup>10</sup> showing blood group percentage distribution in the general United States population. The variation in incidence of blood groups in the United States probably represents changes in values due to a shifting population and to influx of other racial groups in areas selected for surveys.

TABLE 3. *Distribution of blood groups in United States*

Investigator	Groups (per cent)			
	O	A	B	AB
Schiff and Boyd <sup>8</sup>	40	40	10-15	5
Snyder <sup>9</sup>	45	41	10	4
Barton <sup>10</sup>	45	39	12	4

## SUMMARY

Survey of 1,000 South Koreans showed 100 per cent to be Rh.-positive. Major blood groups were as follows: Group O, 27 per cent; Group A, 33 per cent; Group B, 28 per cent; and Group AB, 12 per cent. These findings are compared with those reported for other racial groups and geographic areas.

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"Discovery reveals new knowledge, but the new vision which accompanies it is not knowledge. It is less than knowledge, for it is a guess; but it is more than knowledge, for it is a foreknowledge of things yet unknown and at present perhaps even inconceivable."

—MICHAEL POLYANYI, M. D.  
in *The Lancet*, p. 922, June 1956



## Clinicopathologic Conference

Madigan Army Hospital, Tacoma, Wash.\*

### RIGHT HEMIATAXIA

**Summary of Clinical History.** A 54-year-old white woman entered the hospital on 11 February 1955 because of inability to control her right leg for the previous five days, and a history of "seizures or falling spells" for 20 years. The history revealed that on the previous Christmas Day the patient had stumbled or fallen over a rug, striking the back of her head. The injury required medical care. She recovered without any difficulties. On 6 February the patient noticed that she had difficulty controlling her right leg and was unable to move a scatter rug about with her foot. Her difficulty progressed to a point where she was unable to use her right leg satisfactorily in walking, and her right arm and hand also became affected. Her handwriting was very poor and she could not "make her hand do what she wanted it to do." There were no sensory difficulties in any of her extremities, no aphasia, no difficulty in swallowing, nor any involvement of the facial muscles. The patient was right-handed. A neurologist examined the patient and advised immediate hospitalization. The systemic review revealed a history of chronic bursitis of the right shoulder. The patient did not use tobacco or alcoholic beverages.

The patient stated that she had frequent and severe ear infections as a child, particularly on the right side. She was struck by an automobile as a child, and suffered a mild head injury at that time. The patient had experienced "seizures or falling spells" for the past 20 years. There was no incontinence of either urine

\*Brig. Gen. William L. Wilson, MC, USA, Commanding General. From the Neuropsychiatric Department, Col. Alva E. Miller, MC, USA, Chief

or feces. Neither aura nor tonic or clonic movements were recorded. The patient stated that at times she would get an odd sensation starting in her toes and sweeping up through her body. Prior to admission she had been taking Phenurone (brand of phenacemide) for her seizures. She was married at 20 years of age and gave birth to twin sons. The patient stated she had never been the same since the birth of the children. At about 35 years of age the patient underwent a hysterectomy because of alleged pressure on the spinal nerve by an enlarged uterus. Her local physician regarded this lesion as a possible cause of her "blackout spells." The patient's husband, a year prior to admission, had deserted her for "greener pastures." A biopsy specimen of a breast lesion was reported as benign. The date of this procedure was not recorded.

The patient's mother was living and well; her father died of arteriosclerotic heart disease. Four siblings were alive and in good health. There was no family history of seizures of any kind. The patient had twin sons, one of whom had caused her considerable anxiety within the past year as a result of being arrested and sentenced to prison. He was released about two weeks prior to her hospitalization.

**Physical Examination.** The patient was a thin, asthenic-appearing white woman in no acute distress, appearing to be her stated age of 54 years. She was co-operative and well oriented. Eye examination revealed normal corneal sensitivity, normal associated movements, and no evidence of papilledema. Vision without correction was 20/80 on the right and 20/50 on the left. The pupils were equal and responded to light and in accommodation. The right ear drum showed a large perforation in the superior-posterior quadrant. The left ear drum was normal. The patient had compensated edentulism. The pharynx was negative, and the neck showed no adenopathy. The chest revealed equal expansion, and the lungs were clear to percussion and auscultation. The heart border on the left was palpated and percussed slightly outside the midclavicular line. The rate and rhythm were normal. There was a grade I to II blowing systolic and diastolic murmur in the aortic area. A continuous murmur, thought to be a venous hum, was heard in the vessels of the neck. The *dorsalis pedis* pulses were palpable. The blood pressure was 115/70 mm Hg, and pulse rate 76/min. The abdomen was soft; liver, spleen, and kidneys were not palpable; the descending colon was cordlike and easily palpable.

The extremities revealed no gross abnormality but showed limitation of motion in both upper and lower right extremities. The patient lacked full flexion and extension in both right knee and hip joints and was unable to extend the right arm fully. The right wrist joint showed good movement. No muscular fibrillations were

noted. There was moderate atrophy of the right shoulder girdle muscles.

The neurologic examination revealed the cranial nerves to be grossly intact. The finger-to-nose test was unsatisfactory due to limitation of motion of the right arm. Deep tendon reflexes were hyperactive but equal bilaterally, and no pathologic reflexes were noted. Pain, temperature, and touch modalities were all intact. No clonic movements were elicited. The abdominal reflexes were absent.

**Laboratory Studies.** Hematocrit was 38 ml/100 ml, and the cardio-lipin microflocculation test was negative. Urinalysis was normal. Spinal fluid examination on 16 February revealed an initial pressure of 180/mm of water and a closing pressure of 160/mm of water. The spinal fluid was clear; cell count, 0; sugar, 68 mg/100 ml; chlorides, 708 mg/100 ml; globulin, no increase; total protein, 55 mg/100 ml; colloidal gold, 000-000-000-0. Roentgenograms of the chest revealed normal lungs, heart, and bony thorax. Roentgenograms of the skull, right shoulder, and right knee were reported to be negative. The electrocardiogram on 18 February was within normal limits.

**Course in Hospital.** Examination by the hospital neurologist at the time of admission revealed no localizing neurologic signs. Because of complaints of pain in the right shoulder and a history of "bursitis" for a long period of time, orthopedic consultation was obtained. The consultant reported "tightness" of the right shoulder, particularly of the subscapularis muscle. Both forearms were of equal circumference. The patient was considered to have a conversion reaction, and physiotherapy was recommended for her shoulder. On 21 February the patient's right hand became much worse, and for the first time a positive Babinski reflex was present on the right side with partial paralysis. She was unable to distinguish between simultaneous stimulation of two different areas of the body. On 23 February the cardiac consultant noted distention of the temporal veins and a murmur, heard best beneath the right mastoid but also heard contralaterally. A palpable thrill was present over the right carotid artery, and it was the consultant's opinion that the systolic murmur originated above the clavicle. During the three days from 21 to 24 February there was disintegration of the patient's demeanor, and she became lethargic and developed a mild motor aphagia. She also complained of severe, persistent occipital headache, not relieved by aspirin or codeine. A neurosurgical consultation on 24 February revealed complete right-sided hemiplegia. There was no papilledema, the visual fields were full, and the internal carotid arteries showed normal pulsation on palpation. An electroencephalographic test revealed 25 cycles per second with asymmetry manifested by later-



alization, with slow frequency in the left temporal and left parietal regions and low amplitude in the left parietal region.

On 10 March at another military hospital, four injections of 35 per cent Diodrast (brand of iodopyracet compound), 12 ml each, were made into the left internal carotid artery, after which the patient had a severe convulsive seizure followed by total aphasia. This was controlled by immediate left stellate ganglion block, and the patient was returned to the ward in good condition. The roentgenogram revealed a large left anterior communicating branch of the circle of Willis. The right posterior cerebral artery was well visualized and led into a large arteriovenous malformation, better visualized just to the right of the midline but believed to extend bilaterally. (A small calcific shadow about 1.5 cm in diameter was seen posterior to the sella turcica, to the left of the midline near the petroclinoid ligament.) The sella turcica was within normal limits of size with no evidence of erosion. The pineal gland was not calcified. The cardiac shadow was slightly enlarged consistent with left ventricular enlargement. Blood pressure remained at 100/80 mm Hg. On 22 and 23 March, the patient experienced several grand mal and petit mal seizures. On 1 April the patient was seen by a civilian neurosurgical consultant, who felt that she had an inoperable lesion.

The patient was readmitted to Madigan Army Hospital on 12 April for custodial care. She indicated evidence of headache by sign language and had lost considerable weight. On 22 April her condition was considered critical. She was totally aphasic, with complete paralysis on the right side. On 24 April the patient quietly died at 0402 hours.

### DISCUSSION

Doctor Lin:\* A 54-year-old female patient complained of loss of control of the right arm and right leg for at least five days. Considering the ataxia of the lower extremity there are generally three possibilities, namely, a vestibular lesion, a cerebellar tract lesion, and a posterior column lesion. In ataxia of the upper extremity there are only two possibilities, namely, a cerebellar lesion and a lesion involving the proprioceptive sensory fibers. If this ataxia is due to a lesion of the proprioceptive sensory fibers, then that lesion would have to be in the left parietal lobe. Any lesion which involves the proprioceptive fibers below the thalamus will also involve the fibers of pain and touch. So the differential diagnosis, insofar as localization of the cause of right hemiataxia is concerned, is whether this is due to a right cerebellar lesion or a left parietal lesion.

This patient did not present the classical triad of symptoms of a cerebellar lesion, namely, ataxia, nystagmus, and an intention tremor. The patient's sensations of pain, touch, and temperature are described

\*Capt. Paul M. Lin, MC, USA, Chief, Neurosurgery Service, Surgical Department.

as normal. There is no statement in the protocol that the position sense or stereognostic sense was intact. It is usually difficult to make diagnosis of an early parietal lobe lesion on a casual sensory examination alone, unless one is particularly careful in soliciting the loss of position or stereognostic sense. This patient at the time of admission complained of inability to use the right arm and right leg. There is no statement that she actually had weakness of the right extremity. The limitation of movement of the right arm is felt to be due to a painful shoulder, probably a manifestation of bursitis. The orthopedic consultant felt that she did not have any local shoulder lesion. In view of the incongruity between the inability to use the right arm and the lack of motor weakness, the patient was regarded as a case of conversion reaction at the time of admission. However, there was one positive finding, namely, marked atrophy of the right shoulder. This atrophy certainly was not due to bursitis or disuse because there was no local lesion. This atrophy certainly could not be due to motor paralysis, since there was no weakness. There was no sensory loss to suggest a peripheral nerve disease. Atrophy without motor weakness is clinically suggestive of an early parietal lobe lesion. Guthrie,<sup>1</sup> from his wide experience with gunshot wounds in World War I, was the first writer to describe muscular atrophy in a contralateral arm and leg and hypotonia without motor weakness as a definite clinical syndrome due to a parietal lobe lesion. Moreover, he described the atrophy and the soft, velvety consistency of the skin of the opposite side of the body as a "ladylike skin." Penfield and Robertson<sup>2</sup> also found that a child who developed a parietal lobe lesion before the age of three years subsequently revealed muscular hypogenesis without evidence of motor weakness of the contralateral extremity.

I believe that this woman had an early parietal lobe syndrome manifested by tight hemiataxia, muscle atrophy of the right shoulder without evidence of motor weakness, and a history of multiple seizures with bilateral tactile aura. These features taken together suggest a parietal lobe lesion.

The possibility of frontal ataxia should also be considered. This sign is an ataxia produced on the opposite side of the body by a frontal lobe lesion. The reason for its occurrence is related to the close anatomic and physiologic connection between the frontal lobe and the cerebellum through the fronto-ponto-cerebellar tract. This entity has also been described as prehemiplegic and posthemiplegic ataxia. Later, the history states that this patient also had right hemiplegia.

The patient disclosed no evidence of personality change or memory loss which would suggest a prefrontal lobe lesion. The patient had normal visual fields, which rules out occipital lobe and posterior temporal lobe lesions. There is no reason to suspect that this patient had any lesion in her right cerebral hemisphere. The ataxia can be explained on the basis of an early left parietal lobe lesion rather than a posterior fossa lesion. No cranial nerves are involved to suggest a brain stem

lesion. I am willing to say that this patient had an early left parietal lobe lesion which later on rather rapidly involved the posterior frontal motor area and Broca's area of speech.

Now, as to the nature of this lesion: if the petit mal seizures were caused by the same organic lesion which eventually resulted in her demise, then this lesion must be benign for the patient to have survived 20 years. I believe that the most important physical findings were the murmur audible over both mastoid areas and the neck, and the thrill felt in the right side of the neck. The murmur audible in the mastoid area could be due either to intracranial causes or to a murmur transmitted from the heart. Ordinarily, a murmur of aortic valve origin would have to be rather harsh in the aortic region to be audible in the mastoid area. I do not think that this patient's grade I or grade II aortic murmurs would be clearly audible over the mastoid areas. A murmur of aortic origin is usually louder in the neck than in the mastoid region. The reverse is true if the murmur is of intracranial origin. The cardiac consultant was of the opinion that this murmur was "probably of intracranial origin." Doctor Dickerson, would you like to comment on this murmur?

Doctor Dickerson.\* I should prefer to confine my remarks to a complete reading of the note which was made at the time under the date of 23 February. The patient was seen at that time because an intern had noted a murmur heard at the angle of Louis over the sternum, which was considered incidental because the patient was regarded at that time as having a conversion reaction. The note of this date is as follows: "Pertinent physical findings are those of a grade I to II systolic and diastolic murmur audible over the pulmonic listening area which is transmitted upward into the neck. There is a continuous murmur in the neck, more prominent in the systolic phase. There is distention of the temporal veins without thickening or tortuosity of the peripheral arteries. Arterial pulsations are readily palpated in the occipital area, and the vessels are thickened. The murmur in the neck has its maximum intensity beneath the right mastoid area, although it is transmitted to the opposite side as well. This is not a venous hum because it cannot be obliterated by moderate pressure. In addition, there is a palpable thrill over the right carotid artery which is faint but unequivocal. Ophthalmoscopic examination, though unsatisfactory, does show blurring of the disk margins bilaterally with some erythema of the disks and, I believe, a recognizable degree of papilledema. Examination of the chest clearly indicates the murmur's origin as being well above the clavicles. I believe that it is an acute cerebral vascular lesion with findings consistent with an arteriovenous aneurysm, a vascular tumor, or an atypical subdural hematoma. Recommend the patient have immediate cerebral angiography." At that time, it seemed most certain that the patient was not suffering from a chronic disorder. On the other hand, she talked and

\*Lt. Col. Robert B. Dickerson, MC, USA, Chief, Cardiology Service, Medical Department

acted as if she would enjoy discussing her numerous illnesses at considerable length.

**Doctor Lin:** Doctor Dickerson, you mentioned that this could not be a venous hum. Was it because you occluded the jugular vein distal or proximal to the point of auscultation?

**Doctor Dickerson:** I think the distinction is academic, and I was not concerned with whether the applied pressure was proximal or distal to the point of auscultation. What was meant to be conveyed was the fact that a venous hum is readily effaced by pressure over the vessel whereas an arterial bruit is not.

**Doctor Lin:** Isn't it true, Doctor Dickerson, that if the thrill or hum from the arteriovenous anomaly is due to the turbulent action of the arterial flow in the vein, pressure exerted on the contents of the carotid sheath distal to the point of auscultation would obliterate only the humming of intracranial origin, while pressure on the carotid contents proximal to the stethoscope would obliterate any arterial thrill?

**Doctor Dickerson:** Perhaps you did not understand me. When I said it is not possible to obliterate the hum by pressure I meant ordinary pressure. Considering an elevated venous pressure you are not going to efface the thrills. Of course, if you apply enough pressure to occlude the artery, then the sound disappears. This is the characteristic finding of an aneurysm. However, let me state in summary that the murmur in the neck was not regarded as cardiac in origin.

**Doctor Lin:** Theoretically, a very malignant glioma could possess enough arteriovenous shunt to produce some murmur. Indeed, a very vascular meningioma may do the same thing. A bruit is usually heard over the scalp at the site where the tumor is actually situated. A very large-sized aneurysm is usually situated at the intracranial portion of the internal carotid artery. The murmur is usually audible on the same side in the vicinity of the aneurysm. This patient did not have extraocular motor weakness or trigeminal nerve involvement, symptoms usually associated with such a lesion. The most common cause for the murmur heard over the scalp is an intracranial arteriovenous anomaly. There are usually two types: One is the congenital type—the arteriovenous aneurysm; the other is of traumatic origin—the arteriovenous fistula. The arteriovenous fistula is usually due to fracture of the base of the skull causing communication between the cavernous sinus and the internal carotid artery. The latter frequently has obvious ocular findings and the murmur is usually best heard in front of both eyes. This patient did have a head injury before the onset of her recent symptomatology but the fall was not serious enough to suggest that she had sustained a basal skull fracture. The most likely diagnosis, therefore, is a congenital arteriovenous anomaly. One finding of significance is the presence of distended temporal veins. There was no mention upon which side the temporal veins were distended, so I presume it was both sides. Is that correct, Doctor Dickerson?

Doctor Dickerson: That is correct.

Doctor Lin: It is not unusual to see distended temporal veins or scalp veins in a case of arteriovenous anomaly if the arteriovenous anomaly drains all its blood into the superior sagittal sinus. When the pressure in the superior sagittal sinus is increased due to the arterial flow, then it is possible for the scalp veins to be distended through their connection with the emissary veins. The chronicity of this case also suggests that there is probably a congenital anomaly.

There is one perplexing point, namely, that this patient obviously had the lesion in the left cerebral hemisphere. Now, why was the thrill and murmur heard on the right side? The fact that the murmur is best heard over the mastoid area is because of turbulence of the arterial blood in the underlying transverse sinus. Because the murmur is better heard on the right side does not necessarily mean that there has to be an arteriovenous lesion on the right side. It only indicates that the arteriovenous anomaly drains its blood into the superior sagittal sinus which in turn drains most of its blood into the right jugular vein. A murmur from an arteriovenous anomaly in the left cerebral hemisphere which drains its blood into the superior sagittal sinus may be best heard in the right mastoid area. Similarly, any murmur produced by an arteriovenous anomaly which is deep-seated and which drains most of its blood into the great vein of Galen may best be heard over the left mastoid area, and if there is any hum or thrill in the neck it would be felt on the left side.

If this was a benign arteriovenous anomaly, why then the sudden progression of symptoms? It could be due to a sudden progressive increase in the size of the arteriovenous anomaly encroaching from the parietal lobe to the posterior frontal lobe or it could be due to a slow-growing intracerebral hematoma. Another possibility is the shunting phenomenon seen in many arteriovenous anomalies. The arteriovenous anomaly in the left parietal lobe could shunt more of its blood from the middle cerebral artery and as a result produce oxygen deprivation in the left motor cortex.

Later on this patient developed lethargy. Lethargy is due either to increasing intracranial pressure or direct involvement of the hypothalamus and mesencephalon. The early spinal tap did not show any significant increase of intracranial pressure. The lethargy could be explained on the basis of the deep extension of the arteriovenous anomaly into the midbrain. May we have the x-ray film of the right shoulder please? Doctor Maki, is there any evidence of atrophic calcification in the right shoulder?

Doctor Maki: Yes, there is a slight amount of demineralization of the bony structure. In addition, there is moderate atrophy of the shoulder muscles. There is no evidence of calcification in the subacromial bursa.

\*Capt. Henry E. Maki, MC, USA, Chief, Radiology Service.

**Doctor Lin:** The most striking feature in the plain skull x-ray film is a markedly dilated left middle meningeal artery (fig. 1). This finding is almost characteristic of a parasagittal meningioma. Purely on the basis of physical findings, I am sure that this patient has an arteriovenous



*Figure 1. Lateral view of skull with the arrow pointing to the dilated left meningeal artery. A small mass of calcification can be seen behind the posterior clinoid process.*

anomaly. It is rare to have an arteriovenous anomaly receiving its blood supply through both the internal carotid artery and the middle meningeal artery or branch of the external carotid artery. There is no osteoblastic change in the inner table of the skull, frequently seen in a meningioma. The other significant finding here is the large groove formed by the superior sagittal sinus. The enlargement does not go all the way down to the torcular Herophili. It seems that the enlarged superior sagittal sinus only involves the middle and anterior portion. The posterior por-

tion is not enlarged. This suggests that there may be an obstruction of the superior sagittal sinus.

The other finding is a discrete calcified lesion situated on top of the left petroclinoid ligament. It seems that this calcification is attached to the posterior clinoid process and appears not to be related to the patient's illness.

The left cerebral angiogram shows that the anterior cerebral artery is in normal midline position in the anteroposterior projection (fig. 2).



*Figure 2. A left anteroposterior projection of the left carotid angiogram at the early arterial phase. The anterior cerebral artery is in a midline position. A questionable density suggesting the venous stain of a vascular anomaly can be seen posterior to the shadow of the right frontal sinus.*

There is one striking finding in the lateral view (fig. 3): The callosomarginal branch of the anterior cerebral artery, instead of curving all the way back as it normally should, stops abruptly at its midportion and then curves upward as if being stopped by a lesion. The other interesting finding is that the middle cerebral artery is depressed downward, as commonly seen in a parasagittal or superior convexity lesion. In the late arterial phase or early venous phase, one sees the presence of the arteriovenous anomaly situated in the parietotemporal area. In the late venous phase there is a diffuse dye stain covering the entire left parietal lobe and most of the occipital lobe.



*Figure 3. Lateral projection of a left carotid angiogram during the arterial phase showing the upward curvature of the callosomarginal branch of the anterior cerebral artery. A large vascular anomaly is located in the parieto-temporo-occipital area.*

This is the difficult part of the interpretation of the cerebral angiogram. Is all of this density in the parieto-occipital lobe part of the



arteriovenous anomaly? There is no doubt that the lower portion of the parietotemporal area contains large veins of the arteriovenous anomaly. I cannot see any connection between these tortuous veins in the parietotemporal area and the dye in the parieto-occipital region. There seems to be a line of demarcation between the two blotches of dye. Now, if all of these are the arteriovenous anomaly, this is a huge lesion. One would expect a much larger source of arterial blood supply, and instead it is only supplied by a small branch of the middle cerebral artery. The density in the left parieto-occipital area is therefore indicative of a tumor.

In summary, my diagnosis, after seeing these x-ray films, is that this patient has two lesions—one, an arteriovenous anomaly of the left parietotemporal area, and two, a meningioma in the left parietal parasagittal area. The lack of lateral shift of the anterior cerebral artery in the anteroposterior cerebral angiogram could result from the fact that the lesion is probably too far posterior. The other explanation for the lack of lateral shift is that this may be a bilateral parasagittal lesion. This would also explain the patient's bilateral tactile aura of the sensory seizures. I do not think that the calcified lesion originating from the posterior clinoid process is of any significance. I think it is probably a benign lesion and perhaps a small meningioma too.

**Dr. Lin's diagnoses:**

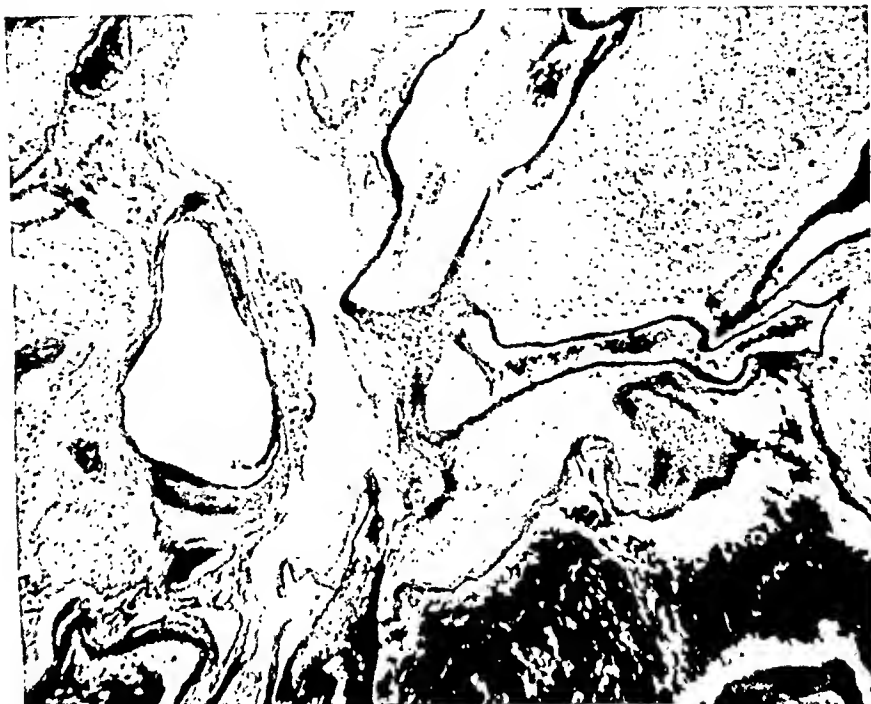
1. Arteriovenous anomaly, left parietotemporal area, with massive intracerebral and subarachnoid hemorrhage
2. Meningioma, left parietal parasagittal area

**PATHOLOGIC FINDINGS**

**Doctor Pophal:**\* The autopsy revealed a markedly emaciated woman appearing older than her stated age and weighing 83½ pounds. The brain weighed 1,330 grams and showed marked flattening of the convolutions, principally over the left cerebral hemisphere. In the right parietal lobe adjacent to the occipital lobe there was a 5-cm. cavernous vascular anomaly (fig. 4) supplied by the right posterior cerebral artery. This lesion is regarded as a congenital vascular malformation rather than a true neoplasm and was most likely responsible for the patient's fainting seizures, probably based on episodes of cortical parenchymal hypoxia. The bilateral mastoid murmurs and thrill in the right side of the neck are considered to be a manifestation of an arteriovenous communication. The demonstration of this vascular lesion on the right side by left carotid arteriogram indicates shunting of blood through the circle of Willis. However, the venous drainage could not be traced. There was no cardiac hypertrophy or polycythemia to suggest chronic circulatory embarrassment.

The other lesion of interest was a malignant glioblastoma multiforme in the left frontoparietal area (fig. 5). The lesion was 5 cm in diameter,

\*Capt. Mahlon J. Pophal, MC, USA, Assistant Chief, Laboratory Service.



*Figure 4. Vascular malformation of right parietal lobe.*



*Figure 5. Anterior view of glioblastoma multiforme of left frontoparietal lobes.*

extending anteriorly to within 3 cm of the tip of the frontal lobe and medially to the corpus callosum. The microscopic features (fig. 6) include small areas of necrosis and hemorrhage, thickening of the walls of small blood vessels, and multiple types of neoplastic cells ranging

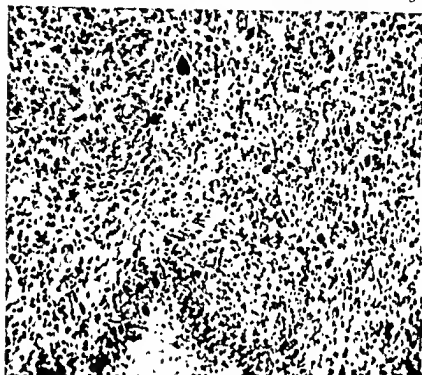


Figure 6. Photomicrograph of glioblastoma multiforme showing thickened blood vessels, giant cells, and necrosis.

from small size with scanty cytoplasm to large multinucleated giant cells. The small calcific body noted on the roentgenograms was not associated with either major lesion. No metastases were found. The lungs revealed hypostatic pneumonitis.

#### Pathologic diagnoses:

1. Glioblastoma multiforme, left frontoparietal lobes
2. Arteriovenous anomaly, right parietal lobe
3. Hypostatic pneumonitis

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# INTERPERSONAL RELATIONS IN THE HOSPITAL

KENNETH E. PURDY, *Hospital Corpsman, second class, USN*

**I**N THOUSANDS of hospitals the world over there are two groups of people working toward a common goal. The groups: the hospital personnel and the patients; the goal: a sick man made well. Many thousands of treatments will be given and millions of procedures followed in an attempt to bring about the patient's recovery. With each treatment and with every procedure, the patient and the hospital staff will be working together, sharing their experiences, and relating their hopes and fears. These relationships, be they good or bad, will influence the patient's recovery as much as will the medications and other treatment he will receive.

Modern medicine has made many and rapid advances in discovering new drugs and treatment procedures and in training personnel to treat the various illnesses that confront them, but has fallen behind in stressing the importance of good interpersonal relationships and in training personnel to deal effectively with the individual as well as the illness. As a result, the patient's stay in the hospital is often prolonged and needlessly frightening, and the recovery can be delayed.

In discussing the importance of interpersonal relationships in the hospital itself, it is necessary to look at the roles of those who have direct contact with the patient. The hospital treatment team consists primarily of the doctor, the nurse, the corpsman, and the *patient*. (Traditionally, nursing care has neglected the participation of the patient in the treatment procedures.) Since successful treatment largely depends on the combined efforts of hundreds of other persons indirectly associated with treatment of the patient, no one member of the team is any more important than the other, and none can be excluded.

### THE MEDICAL OFFICER

In the Navy, the medical officer is in charge of the ward. More rarely, an individual physician is assigned to an individual patient. When in charge of a ward administratively, he is directly

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From the U. S. Naval Hospital, Oakland, Calif. Hospital Corpsman Purdy is now assigned to the U. S. Naval Radiological Defense Laboratory, U. S. Naval Shipyard, San Francisco, Calif.

responsible for ascertaining that the patient receives the type of treatment that will bring about the most rapid and the most complete recovery. He will order the indicated medications and treatments, and will make the medical and administrative decisions that will best help the patient. His experience and training enable him to make these decisions to the patient's advantage.

This same experience and training determines the medical officer's position as the leader of the treatment team, and as such, another of his responsibilities is that of an instructor and counselor to the rest of the team, especially to the members with less training who must rely on ample and clear instruction to perform their duties in the patient's recovery. Staff meetings, individual consultations with the other staff members, and explanations of the patient's illness are a necessary part of the ward medical officer's responsibilities. Unfortunately, many physicians lack the time or fail to realize the importance of this aspect of their role.

To the patient, the physician represents authority in the hospital. He decides not only the patient's specific medical treatments, but to a great extent the pattern of the patient's daily living and oft times for extended periods of time. It will frequently be the physician who determines when the patient can get up, when he can walk about, when he can visit and with whom; it is almost as though the physician were the epitome of the control during his hospital stay, and the physician should be willing to accept this role, too, as one of his primary jobs in helping the patient. The patient will look to him much as a son looks to his father for advice, counseling, and comfort; part of the physician's duties are to recognize this situation and to be aware of its importance.

### THE WARD NURSE

The ward nurse has a different role to fulfill. Her primary duty is to ensure proper nursing care for the patient, to carry out the orders of the medical officer, and to provide the patient with an environment conducive to recovery. In actual practice, her role far exceeds the mere carrying out of orders and the often impersonal routine of good housekeeping. She is a nurse, and as such represents to the patient the kindness and understanding of a mother for her sick and dependent son. Even the word "nurse" brings to mind "tender, loving care," and the nurse should provide just that for the patient. She will be in direct contact with the patient far more than the physician, and is in a position to see the patient as an individual and to help him in many other ways. The patient, by virtue of his illness and hospitalization, is dependent on the nurse to meet many of his needs, both physical and emotional. Neither can be forsaken.

The nurse, like the physician, is also responsible for teaching and helping others on the staff. She has a greater chance to teach them for she will be working directly with them day and night. She can supervise their actual performance on the ward and can many times anticipate difficulties before they arise. Small problems, unchecked, result in needless extension of hospitalization, and the time taken to solve them means less time to help the patient. The nurse can be a helpful friend to the other personnel too, for she understands the fears and doubts that come from not knowing, and can share her understanding with them.

### THE HOSPITAL CORPSMAN

The role of the hospital corpsman is one of the most essential in the military hospital. The corpsman is the one who shares most of the patient's day with him. Often only the corpsman hears the patient's complaints, and shares his hopes and fears. It is the corpsman who is called to the bedside to talk a few minutes with the patient, or to hear the story of something that the patient considers is important enough to be told. Frequently it is the corpsman who gives the medication, who carries out the treatment plan, who feeds the patient and bathes him. The patient on the ward learns to depend on the corpsman, and to trust or not trust him as he warrants. The corpsman is the one who is primarily on call to meet the patient's needs.

The hospital corpsman's medical training is far less extensive than that of the physician or nurse and there are naturally many questions that continually come to his mind. It is the responsibility of the physician and nurse to see that their staff receives ample training, and that their questions are answered, but the corpsman must do his share, too, in training himself. How many questions go unanswered because they have never been asked? Though the physician or nurse may be very busy indeed, usually they will take the time to answer the questions of an interested helper. The responsibility for asking and re-asking the questions, expressing doubts, and presenting the problems that may arise rests with the corpsman himself. It is part of the corpsman's job to see to it that he learns as much as he can in order to better help the patient.

### THE PATIENT

The most important member of the treatment team is, of course, the patient himself. The rest of the team would not exist if it were not for the needs of the sick person, the patient. Each member of the team is obligated to serve the patient to the best of his ability. Let's look, then, at the role of the patient in the hospital.

The patient, no matter what his diagnosis might be, is *sick*. That implies much beyond the illness itself. It is never only an inflamed appendix, a fractured skull, or an acute psychosis. He is an individual, who, unlike the other members of the team, is ill. He has something wrong with him; *he is different*. His illness might be heroic, like a war wound; it might be socially acceptable like pneumonia; or it might be socially unacceptable, like a mental illness, but he has nonetheless left the group of the healthy and come to the group of the sick, that group outside the office or ship, and has joined that "different group" inside the hospital. The patient feels this difference, and knows that he is no longer a part of his former society, but is in a strange and new world, that of a hospital.

The patient coming into the hospital is a confused individual, as anyone would be when confronted with a new and different world, handicapped by an illness that makes it difficult to adjust. The hospital, the white gowns, the examinations, the new and unfamiliar vocabulary of the people around him represent something entirely new to the patient; something he doesn't understand. In this situation he has little idea of what is expected of him; his part in the treatment plan is vague. He realizes only that he is there and that he wants to get well. The hurried receptionist, the abrupt nurse, the whirlwind of examinations, x-rays, et cetera, add to his confusion and to his fears.

All patients are afraid in one way or another. The hospital may represent sickness and death. Through the years of his life the patient has heard other people talk of their experiences in the hospital, and the hospital may have come to represent the terminal place in the course of an illness. "A patient goes to a hospital when he is too ill to be cared for at home; people die in hospitals," and the patient fears this possibility. These fears are exaggerated, but they are present and make the patient's position in the hospital uncomfortable and frightening to him.

If the natural confusion and fear were not great enough hindrance to the patient's recovery, he is also alone. He has been hospitalized, and has been forced to turn himself and his well-being over to strangers. Until his admission he was among his friends; he felt that he had someone to turn to, to talk with, to relate to. He was part of a group, wanted and accepted. Suddenly, when he becomes ill and needs more than ever the support of friends and family, he finds himself alone and dependent upon strangers.

This role of dependency is quite new to the patient as it would be to any mature person. One day he is independent and self-reliant, making his own decisions, going his own way. The next

day he is sick and he must give up his independence. He must ask other people to do this or that; he must depend on others to bring him food, to dress him, in clothes of their choice, even to bathe him. He realizes that, because he is sick, he *must* depend upon these people, and is frightened even more by the realization that he is no longer able to depend on himself. At a most crucial point, when he is disabled by an illness, he must turn himself over to strangers. How can he feel secure that they will care for him? What if they let him down? What if they make a mistake? It is a frightening situation, and what is more frightening is that the patient is helpless to do anything about it.

Thus, the patient in the hospital is far more than a specific illness as described in a medical textbook. He is someone who knows neither what is expected of him nor what will happen to him. Sickness, illness, and injury are probably something new to him, and he is dependent upon strangers to carry him over a most crucial part of his life. With this in mind, medical practice must be aware that there is much more to treatment than medications, clean dressings, and hospital surroundings.

#### THE PATIENT'S ORIENTATION

The patient's treatment actually begins as soon as he enters the hospital; his recovery is either started or delayed at that time. His first meeting with the nurse or corpsman begins the first phase of the relationships that will develop during the course of treatment; that of orientation.

The patient, entering the ward for the first time, is entitled to a good, friendly orientation. He should be made to feel at home on the ward and a part of the new group of people immediately. His first impression should be that he is the most important person on the ward at that moment, for, in effect, he is. His orientation should include a trip around the ward, if practical, so that he will be physically acquainted with his new surroundings. The head, the galley, the visiting areas, et cetera, should be pointed out to him, and he should be indoctrinated to the new routines that he is expected to follow. The time it takes for a thorough indoctrination is small compared to the time it will take at inconvenient moments, to show the patient these places as he needs them.

An introduction to the people on the ward is the second part of a good orientation. The other patients on the ward are to be his new friends, and he needs to know them and to be accepted by them. As soon as he is able to make new friends he will begin to feel less alone. Much of the orientation can be accomplished for the nurse or corpsman by the other patients if she helps the new patient to make friends quickly. The patient should



be introduced as soon as possible to the hospital staff on the ward, too, that he might learn to trust them at the start.

The orientation does more than just acquaint the patient with the ward and the personnel. It is either a positive or negative step in making him feel wanted, respected, and cared for. If he feels at the start that he is in good hands, he will probably continue to feel that way; if, however, the staff have no time to acquaint him; if he is rushed through the orientation in an impersonal manner, the seeds of doubt will be sown, and he will wonder if they have time for him when he really needs it.

If and when the patient begins to feel at home on the ward, and begins to feel secure and wanted, he will begin to identify with the other people around him, especially with the personnel who are caring for him. This can be of advantage or disadvantage to the patient, depending on how the personnel conduct and present themselves. The patient will begin to accept as his own the characteristics and feelings of those around him. It is up to the nurse and corpsman to allow him to gain strength and confidence from them. This they can do only if they present themselves as secure, honest, and interested persons. The patient is not able to draw confidence that is essential to his well-being from those who present themselves as insecure and doubtful. It is necessary that the corpsman and nurse examine themselves critically during all phases of the treatment, so that they may present themselves advantageously to the patient.

The patient, in his everyday relationships with the nurse and corpsman, will take from them whatever is available; strength, confidence, hope, et cetera. On the other hand, he may draw from these people fears, doubts, and insecurities. These additional fears, combined with his natural doubts, can hinder his recovery to a great extent. The staff must provide as part of their duties, positive feelings for the patient while he is being treated. This they can do only by understanding themselves as well as the patient, and by working with his well-being in mind at all times.<sup>1</sup>

### THE TEAM CONCEPT

If a team is to work as such, especially where the welfare of another person depends on its effectiveness, the members must work in harmony. Successful treatment starts with good interpersonal relationships among the staff. There is no time in the hospital for petty differences among the staff members, and certainly no place for the larger and more complex difficulties that may result if the small problems are allowed to grow. The team must work together to solve these smaller problems as they arise. To do this, however, it is necessary that they be able to communicate with one another on a friendly level. Each

member of the team should feel free to express himself to the others, and should seek advice and help from the others. From the doctor to the corpsman, each person has ideas that are good and sound and makes observations and formulates opinions from which the other team members can profit. At the same time each of the members must respect the others, and realize that each is capable of making errors, and that the other man's opinion might be better than one's own. It is true that decisions of a medical nature must be made by the doctor, but decisions affecting the patient's daily living and his emotional well-being should be discussed by all concerned in order to provide the best care. Each team member should be given the opportunity to relate his experiences and present his ideas, and each should be made to feel that he is needed and is important to the patient's welfare.

An effective way of presenting staff problems and discussing the patient's welfare is in staff meetings, at *frequent* intervals. In these meetings the nurse and corpsman can learn what is indicated for the patient's care, and the doctor can learn what the patient says, does, and feels during the 23 hours when he isn't able to be with him. Personal differences among staff members, differences between staff members and the patients, and general ward problems can be brought into the open and resolved in an intelligent way. When the team feels and thinks as a team, they will work as a team.

It is the primary duty of the treatment team to bring about a resolution of the patient's illness; it is, in fact, their sole purpose in being in the hospital. To resolve the illness they must also resolve the doubts and fears that are hospitalized with the patient. This can only be done by critical observation of oneself and by promoting a feeling of good will on the ward at all times. Interpersonal relationships, positive or negative, are decisive factors in the patient's recovery.

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"But the only answer that will impress me is an adequate experiment. Not 1000 experiments with 10 million trials and by 100 separate investigators giving total odds against chance of  $10^{1000}$  to 1—but just one good experiment"

—GEORGE R. PRICE  
in *Science*, p. 367, Aug. 1955

# IMPROVED RIPCORD FOR RELEASE OF INTERMAXILLARY ELASTIC FIXATION

JAMES M. STRICKLAND, *Major, USAF (DC)*

**S**EVERAL types of ripcord for quickly removing intermaxillary elastic fixation in fractured jaw cases have been reported.<sup>1</sup>

All are effective but require that two ripcords be pulled, one for each side of the mouth. Considering the physical urgency and acute mental anxiety experienced in vomiting, and the mental awareness of the physical limitation of opening the mouth after fixation of the fracture, it is important that there be only one ripcord for the patient or an assistant to locate and pull.

In an improved technic (figures 1 and 2) a single ripcord wire is passed through, rather than lingual to, all intermaxillary elastics so that the pull will be on the distal extent of each elastic. In this way, some of the elastics will be pulled off the intramaxillary loops while others will be severed by the wire. Severing only the distal extent of each elastic requires half the pull to sever both distal and mesial extents, as would be necessary if the wire were lingual to both.

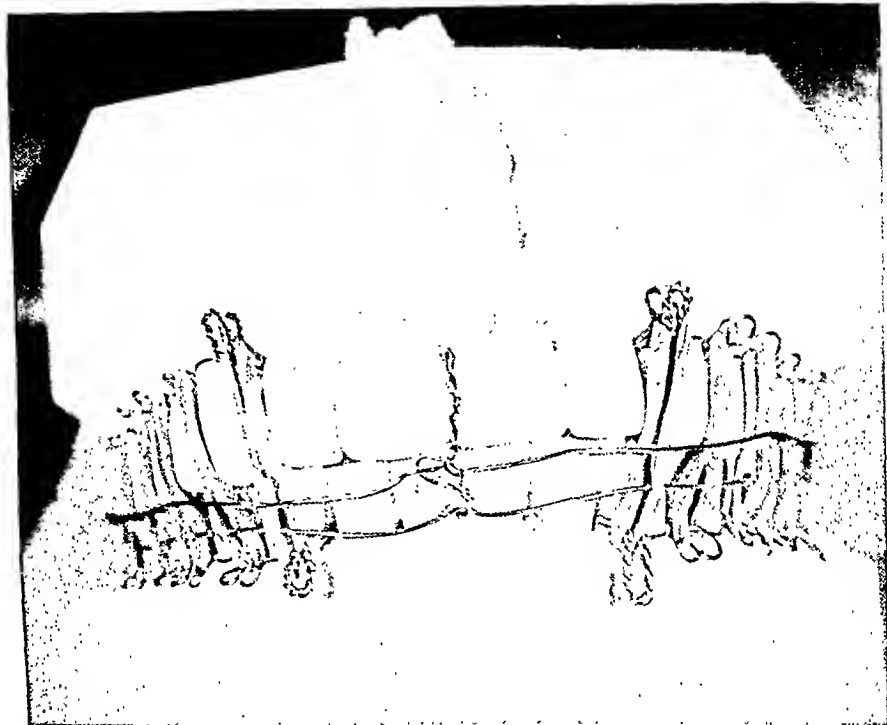
One end of the ripcord is passed through the intermaxillary elastics from anterior to posterior on one side of the mouth and brought anteriorly facial to all elastics out through the mouth orifice. The other end is inserted in a like manner on the other side of the mouth. At this point there are two ends extending from the mouth and the middle section of the wire laying anterior to the anterior teeth. These two ends and the middle section are secured together in the midline of the mouth to effect a single ripcord. Figure 3 shows a method of securing the wire in this area. The method is important only in that it is effective.

The same one-pull efficiency of this technic can be obtained in the reported methods referred to by securing the right and left ripcords so that both will pull together, thus eliminating the time and confusion of locating and pulling two cords. I do not consider dental floss to be of adequate strength for these cords.

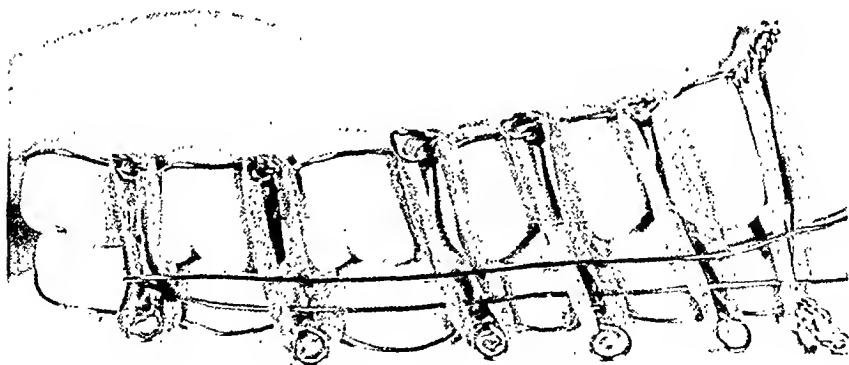
At this base, a ripcord is inserted in the mouth of every patient requiring intermaxillary fixation. It is left in place for the first few days while he recovers from general anesthesia, adjusts

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From U. S. Air Force Hospital, Scott Air Force Base, Ill.



*Figure 1. Anterior view of ripcord on model showing adhesive tape knob facilitating pull.*



*Figure 2. Right lateral view of ripcord on model showing relation of wire and elastics.*

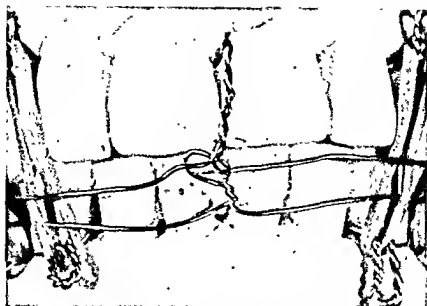


Figure 3. Anterior view of a method of securing wire for most advantageous pull on elastics.

to the difficulties of eating, drinking, and talking with the mandible fixed, and until the traumatic edema, which makes deglutition difficult, has subsided. It is also inserted in all patients leaving the hospital for any reason prior to removal of intermaxillary fixation. In spite of the fact that only a few patients require emergency release of the ripcord, the risk of asphyxiation to one patient because of the failure to provide so simple a preventive is too great to be neglected.

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*It is a classic: the practical man is one who practices the mistakes of his forefathers. —Martin T. Fischer*

## Mucous Cysts of the Lip

HARRY L. LEVIN, *Commander, DC, USNR*

**M**UCOUS CYSTS of the mouth are usually small, but there are occasions when they attain sufficient size to cause disfigurement and to interfere with mastication and speech. The mucous cyst may be confused with a mixed tumor of the salivary glands or with a lipoma.<sup>1</sup> According to Lever:<sup>2</sup> "Mixed tumors of the skin or mucous membrane show epithelial cells arranged in nests and strands as well as around small lumina. Either one or two layers of epithelial cells are present around the lumina and scattered through the stroma. The stroma shows mucoid and hyaline degeneration." The lipoma is a soft, rounded, lobulated subcutaneous growth which may or may not be movable against the overlying skin or mucous membrane of the lip. Lipomas are composed of fat cells which are usually surrounded by a connective tissue capsule. Mucous cysts are fluctuant. The cystic lumen contains large pools of mucin in which may be found scattered leukocytes and desquamated epithelial cells. The cyst wall is thin and is composed of a fibrous connective tissue capsule. Treatment consists of complete excision of the cystic mass to ensure against recurrence.

Mucous cysts are retention cysts caused by blockage of the ducts of the mucous glands or by epidermal inclusions. The cysts contain a shiny mucinous fluid with a high cholesterol content, and crystals or slits are easily detected in microscopic section. The incidence of this type of cyst is higher in the young than in the adult; Baden<sup>3</sup> reported his experience with a mucous cyst in a 12-month-old infant, and Meyer<sup>4</sup> removed a retention cyst from the oral cavity of a 3-month-old baby.

## CASE REPORTS

**Case 1.** A white seaman about 20 years of age, well nourished and in no apparent acute distress, presented himself for removal of a mucous cyst of the right side of the lower lip. The cystic mass was painless and fluctuant when palpated. He had not been injured in any manner, nor had he traumatized his lip by biting it while he slept. He awoke one morning noticing a small elevation about the size of a pea. After a short time the patient became disturbed, for the cyst began to grow rapidly, attaining the size of a hazel nut within a period of six weeks (fig. 1).

From U. S. Naval Receiving Station, Boston, Mass.



*Figure 1. Preoperative view of mucous cyst (or "mucocoele"), arising from the mucosa of the lower lip, right side.*

**Case 2.** A 28-year-old white man one morning noticed a cyst on the inner surface of the lower lip which produced discomfort whenever he ate or drank hot foods. At sick call at another activity, it was squeezed, but after a few days it returned to its original size and was painful.

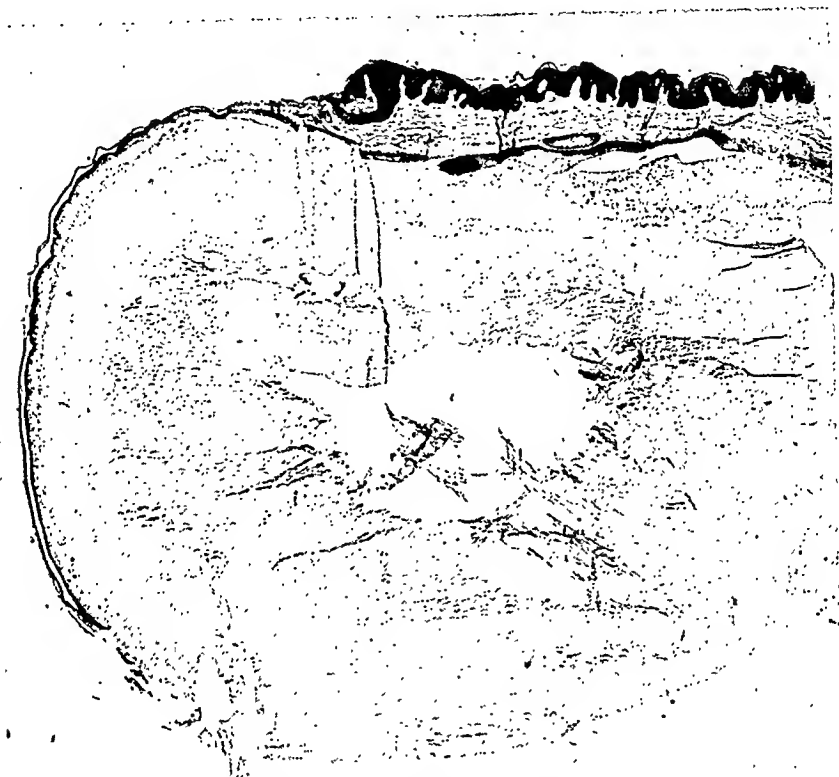
Physical examination was essentially negative for both patients. Neither had any adenopathy of the glands of the neck. Complete blood cell counts, urinalyses, and serologic tests were within normal limits. The presumptive diagnosis in both cases was mucous cyst.

*Pathologist's report (case 1).* The sections shown were taken from the gross specimen (fig. 2), which was a soft, circumscribed mucous



*Figure 2. The mucous cyst just prior to complete enucleation.*

cyst with a small fragment of overlying lip mucosa (fig. 3). The cyst wall was thin and composed of fibrous connective tissue that was infiltrated with chronic inflammatory cells (fig. 4). The cyst was partially lined with squamous epithelium. This was most prominent on the superior aspect immediately beneath the surface mucosa.



*Figure 3. A large, well-circumscribed mucous cyst with a small fragment of overlying lip mucosa.*

#### DISCUSSION

Any lesion, regardless of size, that requires surgical removal should be sectioned and examined microscopically. If it is benign, recovery is usually uneventful and rapid. However, if sections reveal sheetlike arrangement of the cells, predominance of mucoepidermoid cells, and absence of tubular and papillary features (such as are seen in benign forms and mucin pools), the section may be considered potentially dangerous.<sup>5</sup> Malignant degeneration in epithelial cysts is rare, occurring in approximately 1.5 per cent of cases.<sup>6</sup> If such degeneration occurs, it takes the form of squamous-cell carcinoma, which usually is of low-grade malignancy and does not metastasize.



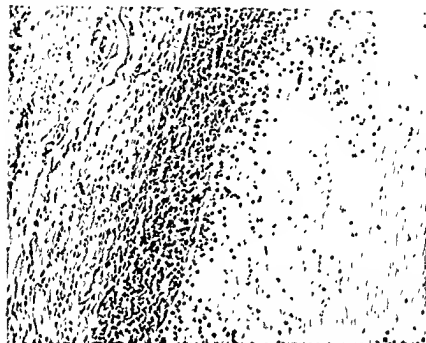


Figure 4. A section of the mucous cyst showing the fibrous wall, granulation tissue with a profusion of lymphocytes, and mucin content of the cyst ( $\times 160$ )

### SUMMARY

Two cases relating to the removal of mucous cysts emphasize the necessity of considering such lesions in the differential diagnosis of growths in the oral cavity. Extreme care should be exercised when enucleating these cysts, which have a tendency to recur.

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# Afibrinogenemia Resulting From Amniotic Fluid Infusion

HERBERT F. SANDMIRE, *Captain, USAF (MC)*  
BERNARD M. COVALESKY, *Captain, USAF (MC)*

THE SYNDROME of amniotic fluid embolism, which usually occurs in the latter part of the first stage of labor and is manifested clinically by dyspnea, sudden shock, and death, was described by Steiner and Lushbaugh<sup>1</sup> in 1941. They believed the clinical picture to be due to widespread pulmonary embolization and an associated anaphylactoid reaction.

Reid, Weiner, and Roby,<sup>2</sup> after studying reported cases of amniotic fluid embolism, observed that the patients who survived the initial shock succumbed one to three hours after delivery. The most prominent finding in this group was the hemorrhagic manifestation; bleeding occurring from the mucous membranes, organ surfaces, and vagina. They were impressed by two unexplained observations: (1) They believed that the amount of mechanical blockage of the pulmonary vessels by amniotic debris was insufficient to be the cause of death in every instance; and (2) the blood at autopsy was liquid, and clotting of any degree was rarely seen.

After concluding that hemorrhagic tendencies play an important part in the syndrome of amniotic fluid embolism, Reid, Weiner, and Roby<sup>2</sup> set up studies of amniotic fluid to determine the responsible component. They found a thromboplastin-like substance which could be substituted for commercial thromboplastin in the one-stage prothrombin test. They found the concentration of thromboplastin in amniotic fluid to be determined by the degree of fetal exfoliation and hence variable from patient to patient.<sup>2</sup>

The presence of thromboplastin in the amniotic fluid led Weiner and Reid<sup>3</sup> to postulate that death in this syndrome resulted from either extensive intravascular clotting or subsequent postpartum hemorrhage. Death occurring suddenly can be explained by extensive intravascular coagulation while death occurring two to three hours after delivery is due to postpartum hemorrhage resulting from afibrinogenemia. The available circulating fibrinogen

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From U. S. Air Force Hospital, Ladd Air Force Base, Fairbanks, Alaska. Dr. Sandmire is now at University Hospitals, State University of Iowa, Iowa City, Iowa.

is rapidly used up in the formation of the intravascular clot and hence afibrinogenemia or hypofibrinogenemia results.

In order for the thromboplastin of the amniotic fluid to initiate defibrination in the maternal circulation, it must first gain entrance to that circulation. Two methods of entry have been suggested. One portal of entry is thought to be through the exposed endocervical veins which become lacerated during normal labor.<sup>2</sup> Rupture of the membranes early in labor may leave these veins exposed to the entrance of considerable amounts of amniotic fluid. The process is further augmented if the fetal vertex blocks the cervix, causing an increase in the intrauterine pressure. The second avenue of entry involves a rupture of the membranes somewhere in the upper segment of the uterus with eventual escape of the fluid through the uteroplacental site.

In the absence of circulating fibrinogen, clot formation at the uteroplacental site does not take place and postpartum hemorrhage occurs. Weiner and Reid<sup>3</sup> advised the use of "the clot observation test" to detect afibrinogenemia. Failure of freshly drawn venous blood to clot or to form a normal-sized stable clot indicates that the circulating fibrinogen has been reduced to a critical level. Also, if the clot, when incubated at 37°C, dissolved within one hour, hypofibrinogenemia was assumed to be present. Weiner and Reid<sup>3</sup> advocated that once the diagnosis of hypofibrinogenemia is made, fibrinogen should be administered immediately to restore the normal clotting ability of the blood.

We believe the following represents a case of afibrinogenemia resulting from amniotic fluid infusion.

### CASE REPORT

A 32-year-old para 2, gravida 10, abortus 7 was admitted to this hospital at 0010 hours, 23 October 1955, at term, having moderate quality contractions with a history of leaking fluid two hours prior to admission. One hundred milligrams of Demerol (brand of meperidine hydrochloride) and 94 mg of Seconal (brand of secobarbital) were used for sedation, and a normal spontaneous delivery, under pudendal block anesthesia with 2 per cent Novocain (brand of procaine hydrochloride), followed at 0207 hours. At 0208, the placenta was expressed with the Credé maneuver. It appeared intact and complete. There was no evidence of abruption or marginal sinus rupture. The patient was returned to her room with less than 100 ml estimated blood loss at delivery. The fundus uteri was firm. No episiotomy or laceration was incurred.

One-half hour later, the patient, who was awake, called the nurse because she felt blood flow. Massage of the now soft fundus was done. It regained some, but not all, of its firmness and the tendency to again become flabby remained.

An intravenous Pitocin (brand of oxytocin) infusion was started followed by dextran at the same time that blood for typing and cross matching was drawn. It was soon evident that the vaginal blood on the bed sheets would not clot. The rate of oozing was of an ominous nature, stopping for brief periods but again recurring. It was of a dark color. The patient was returned to the delivery room and, under gas anesthesia, a vaginal examination was done. It was determined that all of the blood was coming from the fundus, which, with the exception of relaxation, was not otherwise abnormal. By this time, bleeding was more brisk and, at 0600 hours, the second transfusion of a pint of blood was started. At its completion, bleeding slowed considerably and, for the first time, a few tiny clots were seen. The estimated blood loss at this point was 2,000 ml.

At times, the pulse rose to 120 per minute, and the blood pressure dropped to 70/50 mm Hg. No other areas of hemorrhagic diathesis, oral, anal, or skin, were noted.

The patient was returned to the ward at 0710 hours in fairly good condition with a blood pressure of 105/75 mm Hg and a firm fundus. A few minutes later, she again began to ooze moderately in bed. At 0830 hours, a sample of nonoxalated blood was drawn which failed to clot. Prior to this time, inspection of blood drawn for cross matching at 0315 hours showed complete absence of clot formation. Because of these findings and the continued vaginal bleeding, transfusion of the third pint of whole blood was started and four more units were ordered. At 1100 hours, another sample of freshly drawn venous blood clotted in 15 minutes but dissolved 5 minutes later. It was then decided to administer fibrinogen intravenously and 2 grams were given at 1300 hours. Fifteen minutes later, a rather dramatic decrease in vaginal bleeding was noted. A sample of blood drawn at 1500 hours clotted in five minutes and remained clotted. Further observation revealed a stable clot with normal retraction. Since the hemoglobin level on 24 October was only 9.5 grams, an additional unit of blood was given.

On 24 October, the patient spiked a temperature to 102°F, and a diagnosis of endometritis was made. Penicillin and streptomycin were administered and 30 hours later she was afebrile and asymptomatic.

On 27 October, she was given 4 ml of gamma globulin as a preventive measure in minimizing the danger of homologous serum jaundice which may follow the use of fibrinogen.

The patient was discharged in good condition on the sixth postpartum day.

#### DISCUSSION

Afibrinogenemia has been reported to be associated with three different obstetrical conditions: (1) amniotic fluid infusion;<sup>2</sup> (2)

severe premature separation of the placenta;<sup>4</sup> and (3) long-standing intrauterine fetal death.<sup>3</sup>

In the absence of clinical signs and symptoms of abruptio placentae in our patient, the defibrinating process was probably initiated by amniotic fluid infusion. Respiratory symptoms were not a part of the clinical picture in this patient. This probably indicates a slow, prolonged infusion of amniotic fluid into the maternal circulation, being sufficient to cause defibrination but insufficient for the production of widespread pulmonary embolization. The following experimental evidence is offered to support this hypothesis: Several investigators<sup>4-6</sup> showed that rapid infusion of thromboplastin, intravenously, in dogs and cats produces death shortly thereafter. Slow infusion of equal amounts of thromboplastin produces defibrination of the blood but the animals survive.

Quantitative fibrinogen determinations were not available to us; however, the sudden onset of hemorrhage associated with complete absence of clot formation is offered as evidence to support our diagnosis. The cessation of vaginal bleeding and the restoration of normal clotting properties following the administration of fibrinogen also favors a diagnosis of afibrinogenemia.

Roid, Weiner, and Roby<sup>2</sup> stressed the importance of having on hand an available supply of fibrinogen. Inasmuch as obstetrical hemorrhage is still an important cause of maternal deaths, we believe the point deserves to be re-emphasized. Our patient was treated in an isolated station hospital, about 2,000 miles from a commercial source of fibrinogen. We were fortunate in having fibrinogen on hand, and we hope that this case report may stimulate other military hospitals to procure this important drug.

#### SUMMARY

A case of afibrinogenemia resulted from amniotic fluid infusion. Fibrinogen administration was important in the correction of the afibrinogenemic state.

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### THE COST OF COMPLACENCY

Appendicitis was first listed as a cause of death in the vital statistics in 1892. In that year peritonitis had its greatest recent prevalence. For the next decade, the death rate from peritonitis fell and the death rate from appendicitis rose. Appendicitis killed its thousands in the first three decades of this century. After 1930 the death rate from it began to fall. After 1940 it fell almost precipitately. But the disease continued to kill its thousands. It is continuing to kill them. In 1952, 2,600 persons, an average of 217 a month, died in the United States of a disease that may not be preventable but that can be more readily cured than any other major surgical disease. Small wonder that, as an English surgeon recently wrote, acute appendicitis "is in greater need of attention than other and more publicized methods of dying."

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in *GP*, p. 89, Jan. 1955

severe premature separation of the placenta;<sup>4</sup> and (3) long-standing intrauterine fetal death.<sup>5</sup>

In the absence of clinical signs and symptoms of abruptio placentae in our patient, the defibrinating process was probably initiated by amniotic fluid infusion. Respiratory symptoms were not a part of the clinical picture in this patient. This probably indicates a slow, prolonged infusion of amniotic fluid into the maternal circulation, being sufficient to cause defibrination but insufficient for the production of widespread pulmonary embolization. The following experimental evidence is offered to support this hypothesis: Several investigators<sup>6-8</sup> showed that rapid infusion of thromboplastin, intravenously, in dogs and cats produces death shortly thereafter. Slow infusion of equal amounts of thromboplastin produces defibrination of the blood but the animals survive.

Quantitative fibrinogen determinations were not available to us; however, the sudden onset of hemorrhage associated with complete absence of clot formation is offered as evidence to support our diagnosis. The cessation of vaginal bleeding and the restoration of normal clotting properties following the administration of fibrinogen also favors a diagnosis of afibrinogenemia.

Reid, Weiner, and Roby<sup>9</sup> stressed the importance of having on hand an available supply of fibrinogen. Inasmuch as obstetrical hemorrhage is still an important cause of maternal deaths, we believe the point deserves to be re-emphasized. Our patient was treated in an isolated station hospital, about 2,000 miles from a commercial source of fibrinogen. We were fortunate in having fibrinogen on hand, and we hope that this case report may stimulate other military hospitals to procure this important drug.

#### SUMMARY

A case of afibrinogenemia resulted from amniotic fluid infusion. Fibrinogen administration was important in the correction of the afibrinogenemic state.

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# Immobilization of the Fractured Zygoma

JAMES E. CHIPPS, *Lieutenant Colonel, DC, USA*

**T**HE FRACTURED zygoma, if reduced early, is often self-splinting and requires no definitive immobilization. However, the thin walls of the orbital floor and the maxillary sinus may occasionally be grossly comminuted and self-splinting cannot then be obtained. Self-splinting is also precluded when treatment has been delayed until fibrous repair has begun. More often than in other maxillofacial fractures, there is a delay in treatment of the fractured zygoma because of a delay in diagnosis. Masticatory disturbances may be minor, and an acute swelling may mask clinical evidence of displacement. The diagnosis is best made by Water's view radiographs of the mid-facial skeleton, but this particular view is usually not a part of the routine skull series obtained for the patient with a head injury.

When self-splinting is not obtained after reduction, some means of immobilization is required to prevent redisplacement of the fractured zygoma by traction from the masseter muscle.

The usual immobilization device consists of some form of attachment between fracture and a plaster headcap but this method is never entirely satisfactory. If the attachment is rigid, the fractured zygoma moves with the movements of the headcap. If the attachment is elastic, the correct amount of elastic force which provides reduction without overreduction is difficult to maintain, and any horizontal force tends to displace the headcap and induce considerable discomfort. There are several surgical procedures described for avoiding use of the headcap, none of which are desirable if more simple methods can be used.

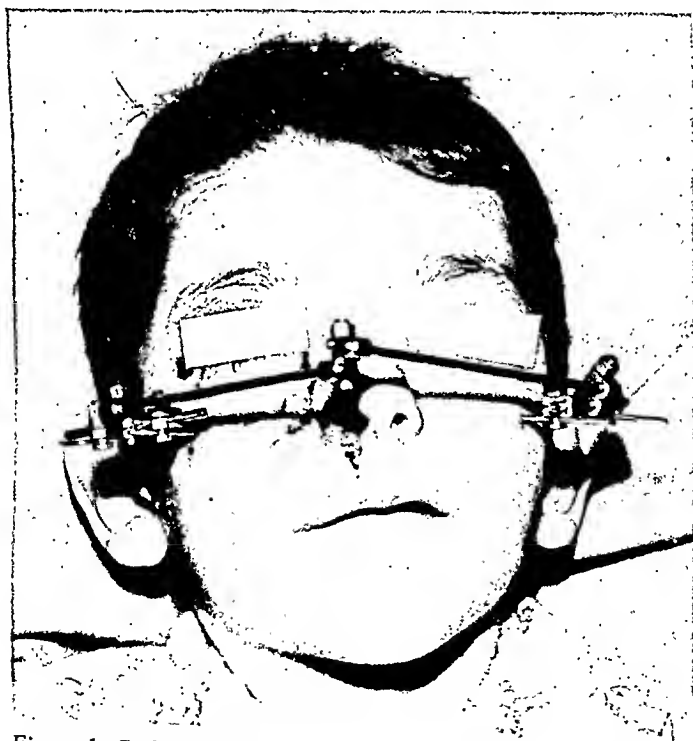
The prominent zygoma with its arch is an obvious point for attachment of skeletal pin units for immobilization of other maxillofacial bones. Thoma<sup>1</sup> described such an attachment for immobilization of the fractured mandibular condyle. Archer<sup>2</sup> described the use of a skeletal pin unit anchored into the fractured zygoma as a means for applying traction for reduction. It, therefore, follows that one method of management is to anchor a pin unit to the fractured zygoma for application of a reducing force and, after reduction, maintain immobilization by attaching this pin

unit to a second unit anchored to the unfractured zygoma of the opposite side.

This method has very likely been employed by many operators but a search of the literature at hand does not disclose that it has been specifically described. In recent cases at this hospital, the method has been so satisfactory in comparison with methods requiring headcaps or open reduction that it is reported.

### CASE REPORT

A 5-year-old boy was admitted to this hospital after an automobile accident. There was an extensive infra-orbital laceration and a markedly displaced fracture of the right zygoma. The base of the fracture was severely comminuted. The laceration was repaired shortly after admission. During this procedure, several unattached bone chips were removed from the maxillary sinus.



*Figure 1. Reduced fracture of right zygoma immobilized to unfractured left zygoma by skeletal pin units and connecting bars.*

The following morning, under general anesthesia, a skeletal pin unit was anchored into the fractured zygoma and used as a handle for obtaining reduction. However, because of comminution and loss of bone substance, redisplacement occurred each time manual traction was

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# Primary Carcinoma of the Fallopian Tube

JEROME P. LONG, Jr., *Captain, MC, USN*  
HAL P. JAMES, *Lieutenant Commander, MC, USNR*  
GEORGE T. MILLS, *Lieutenant, MC, USNR*  
CHARLES E. JABBOUR, *Lieutenant, MC, USNR*  
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**P** RIMARY carcinoma of the fallopian tube is one of the rarest of all malignancies,<sup>1</sup> and only about 530 cases are described in the literature. Wharton and Krock<sup>2</sup> reported 5 such carcinomas in 35,000 gynecologic cases at Johns Hopkins Hospital, and Hu, Taymor, and Hertig<sup>3</sup> found 12 in 3,878 primary malignant lesions of the female genital tract at Free Hospital for Women in Brookline, Mass., an incidence of 0.31 per cent. In one third of all the cases reported, the carcinoma has been found in both tubes.<sup>4,5</sup> This lesion is peculiar in the fact that it is frequently associated with tuberculosis of the fallopian tube. It usually occurs in the middle or outer third.<sup>2</sup>

Primary carcinoma of the fallopian tube is one of the most malignant of all lesions. About one fourth of the cases in the literature have shown a recurrence in one year.<sup>5</sup> Haupt<sup>6</sup> reported that only 6 patients out of 321 cases he received survived for 8 years. This type of carcinoma usually metastasizes to the presacral areas by the retroperitoneal route; to the abdomen, ovary, mesenteric peritoneum, inguinal nodes, liver, lungs, stomach, bladder, skin, and supraclavicular nodes; as well as to the uterine cavity.<sup>5</sup> Even the vagina is often invaded. Where the ends of the fallopian tubes have remained open, metastases into the uterine or abdominal cavities usually occur by spill.<sup>4</sup> Other metastases may take place through the lymphatic and vascular systems.<sup>7</sup>

The carcinoma arises from the mucous membrane of the tube and seldom invades the tubal wall. It usually causes the formation of a hydrosalpinx<sup>4</sup> and produces various signs and symptoms of inflammation of the fallopian tube. On opening the tube, the center of the tumor is found to be filled with a thickened papillary mass that is friable, hemorrhagic, and in some areas necrotic growing on a fibrous groundwork with connective tissue septa throughout.<sup>4</sup> These are classed as papillary and papillary alveolar due to their growth;<sup>6</sup> however, at times, one is classified as an

released. A second pin unit was then anchored to the unfractured left zygoma, the fracture was again reduced, and the two units were rigidly joined by connecting bars (fig. 1).

There were no complications, and after two weeks the pin units were removed without anesthesia. During this period, the patient had no complaints associated with use of the appliance.

### SUMMARY

Comminution and delay in treatment prevent self-splinting of the reduced zygoma on occasion. Delay in treatment because of a delay in diagnosis should not occur if the Water's view radiograph, the best view for disclosing injuries of the mid-facial skeleton, is included routinely in the initial examination of the patient with a head injury.

When required, immobilization of the fractured zygoma can be readily obtained by attaching it by pin units to the opposite unfractured zygoma. This method has proved completely satisfactory in recent cases.

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### MEDICAL MEETING

The Society of Military Ophthalmologists and the Society of Military Otolaryngologists will hold a joint dinner and business meeting at the time of the Annual Meeting of the American Academy of Ophthalmology and Otolaryngology in Chicago on 16 October. All members are invited to attend. Application may be made to either Captain James A. Stokes, MC, USA, Walter Reed Army Hospital, Washington 12, D. C., or to Major Stanley H. Bear, USAF (MC), 3810th U. S. Air Force Hospital, Maxwell Air Force Base, Ala.

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adenocarcinoma because of its glandlike structure. This latter classification is frequently used by the Armed Forces Institute of Pathology, although, according to the majority of the literature, it is incorrect in that there are no glands present in the fallopian tubes.<sup>9</sup>

This particular type of lesion is seldom diagnosed prior to operation, and even then is often missed because the tube is not opened and examined thoroughly. A few reported cases were diagnosed by the Papanicolaou test before operation.<sup>10</sup> Whenever there is a serous or serosanguineous vaginal discharge resulting in the relief of lower abdominal pain, an extra-uterine carcinoma should be suspected, especially after dilatation and curettage has shown the endometrium to be normal.<sup>11</sup> The symptoms that usually bring these patients to the physician are (1) low abdominal pain,<sup>9</sup> varying in character from cramplike to sharp and lancing and referred to the sacrum, bladder, rectum, and down one or the other leg; (2) abdominal enlargement, or (3) a vaginal discharge which is frequently blood-tinged.<sup>1,11</sup> These lesions, especially where there is abdominal enlargement, are frequently confused with uterine myomas, ovarian cysts, and salpingitis.<sup>1</sup> Most patients with primary carcinoma of the fallopian tube are in the menopausal period, although the age of patients has been reported as ranging from 18 to 80 years, the average being 49.5.<sup>11,14</sup> In 70 per cent of all cases reported, the women have been nulliparae. For this reason the condition is thought to be closely associated in some way with sterility.<sup>11</sup>

The treatment of choice is bilateral salpingo-oophorectomy with panhysterectomy.<sup>1</sup> Deep x-ray therapy has been advocated for the majority of cases as a follow-up to the surgical procedure, although the probable benefits are doubtful.<sup>1,14</sup>

The case reported here is of particular interest in that the patient came to the clinic complaining of backache and was found to have a retroverted uterus. She did not complain of anything that was in any way connected with the carcinoma, and because of the position of the uterus, was operated on to relieve her backache. The carcinoma was found accidentally on operation, at which time it had extended from the tube to the ovary.

### CASE REPORT

A 36-year-old, well-developed, well-nourished para 1, gravida 1 was seen in the outpatient clinic of this hospital on 22 July 1954, complaining of a profuse discharge of a bloody type following the normal menstrual period. This discharge lasted for two days.

On examination, the cervix showed evidence of chronic cystic cervicitis and the uterus was 3 degrees retroverted and it could not be replaced at that time. A Papanicolaou smear taken at this time was reported as negative. The patient was instructed to take hot vinegar

douches and was told to return at a later date. She was again seen 3 December, at which time the cervix was clean and the uterus still retroverted. She had no further complaints at this time.

On 4 January 1955, the patient came in complaining of vaginal bleeding following intercourse on the last two occasions. The last menstrual period was normal and she was running a 27- to 28-day cycle. The uterus at this time was still found to be 3 degrees retroverted and was thought to be somewhat enlarged. There was one Nabothian cyst on the anterior lip of the cervix; another cyst, also on the anterior lip, had ruptured with slight bleeding. Another Papanicolaou smear taken at this time was also reported as negative. On 14 January, silver nitrate was applied to the cervix and an attempt to elevate the fundus was unsuccessful. The patient returned 31 January 1955, with backache radiating down both legs of one month's duration. Also during this month she had had spotting of slight degree, off and on. Examination revealed slight cervicitis, and the uterus was still retroverted. A pessary was inserted and the patient was instructed to take hot vinegar douches and knee chest exercise, and dilatation and curettage was advised if the spotting continued. She returned 14 February, complaining only of occasional back pain radiating down her leg. She reported to the clinic 14 March 1955, complaining of spotting off and on. The backache and the leg pains had been relieved by the pessary.

On 21 April 1955 dilatation and curettage and a laparotomy for a uterine suspension, previously scheduled for 7 April but postponed because of an upper respiratory infection, were performed. A lesion, thought to be a hydrosalpinx, was found in the area of the left tube; and between the distal and middle third of the left tube, two areas of a tumor formation were found on the serosal surface. The left tube was removed and on frozen section an adenocarcinoma of the tube was diagnosed. At operation no lymph nodes or extension of the tumor could be seen or palpated. A wide bilateral salpingo-oophorectomy and hysterectomy were performed. The pathologic diagnosis was secretory endometrium; primary carcinoma of the left tube, Grade IV (fig. 1). Uterine myomata and chronic salpingitis and chronic cervicitis were also found on pathologic examination. She had an uneventful postoperative course and was discharged on the eighth postoperative day. She was sent to another naval hospital where between 8 May and 22 June she received 3,728 r tumor units of deep x-ray therapy through two anterior and two posterior areas. The post x-ray therapy period was uneventful.

The patient was again seen in the outpatient clinic of this hospital on 11 July, at which time the abdominal incision was found to be well-healed and there was some induration in the vaginal vault area with slight tenderness and a small granulomatous area in the vagina. This latter was treated with silver nitrate solution. She returned 1 August, at which time the vaginal vault was negative except for some

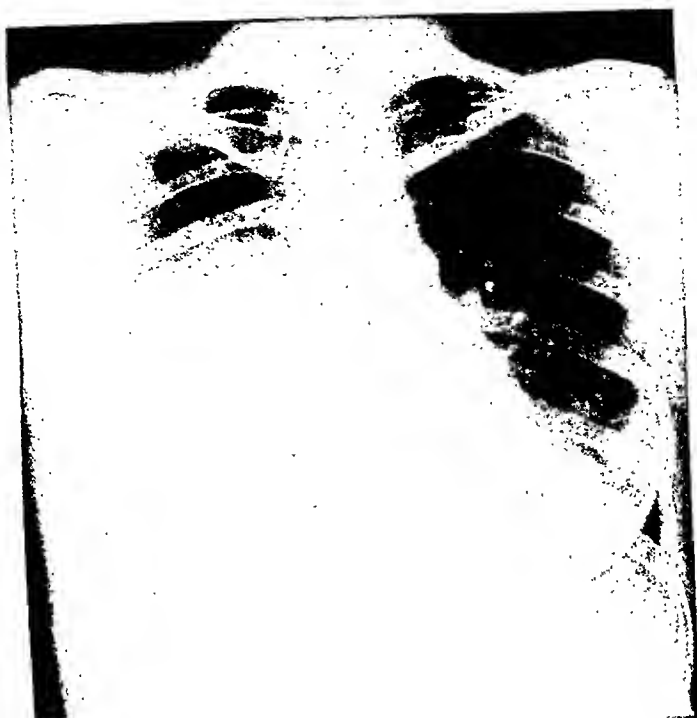


induration and the suspicion of a small, firm mass in the cul-de-sac, over which the vaginal vault and vagina moved freely. She was seen on 10 October 1955 with a large, firm, irregular mass in the pelvis which extended up to the iliac crest and filled most of the pelvis. This mass was fixed. The liver edge was palpated two fingersbreadth below the right costal margin. A roentgenogram of the chest at this time showed a slight elevation of the right hemidiaphragm with fluid or thickened pleura with blunting of the right costophrenic sulcus.



Figure 1. Primary tumor arising from tubal wall showing the papillary pattern and atypical cytologic findings.

On 8 November 1955, the patient again returned to the clinic, complaining of severe abdominal and right subcostal pain which radiated to the right shoulder and down the right arm; increasing constipation; and distention of the abdomen. There was marked tenderness over the entire abdomen, especially below the right ribs. The mass was palpable in the pelvis, but abdominally could not be palpated, nor could the liver at this time be palpated due to the distention and marked tenderness of the abdomen. A roentgenogram taken at this time showed that the lower two thirds of the right lung were completely obscured by pleural effusion and underlying consolidation (fig. 2). The pleural effusion extended up along the anterior lateral wall almost to the apex. The consolidation was suggestive of metastatic disease. The patient was admitted to the hospital. Abdominal distention increased,



*Figure 2. In the roentgenogram of 8 November 1955, the lower two thirds of the right lung was completely obscured by pleural effusion and underlying consolidation and was suggestive of metastatic disease.*

as did the pain and tenderness in the abdomen and the right scapular areas. This was accompanied by constipation and vomiting.

On 1 December the right thoracic cavity was tapped and 1,000 ml of straw-colored fluid was removed. The following day 1,200 ml was removed from the left thoracic cavity. On 3 December, paracentesis was performed and 3,200 ml of straw-colored, cloudy fluid was removed from the abdominal cavity. Following the aspiration of fluid from the chest and abdomen, the patient received considerable relief from the dyspnea which had previously developed. She became rapidly cachectic and gray in color, and her general condition much weaker. A roentgenogram on 9 December showed chronic consolidation of the right upper lobe with increased pleural effusion of the right side of the chest with infiltration of the left base (fig. 3). The patient's condition became rapidly worse and she died 8 January 1956.

**Pathologist's Report.** The primary tumor appeared as a solitary 1.5-cm nodule on the left fallopian tube at the junction of the middle and distal thirds. This tube was slightly dilated and on cut section the lumen was filled with friable grayish white tissue continuous with the nodule described externally. Microscopic examination of the entire hysterectomy

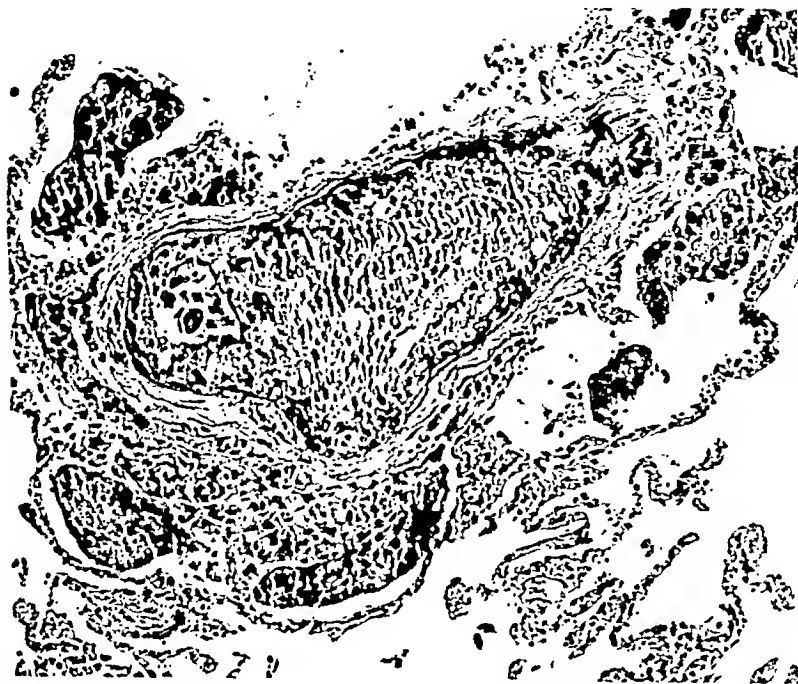


*Figure 3. The roentgenogram of 9 December showing chronic consolidation of the right upper lobe with increased pleural effusion of the right side of the chest and infiltration of the left base.*

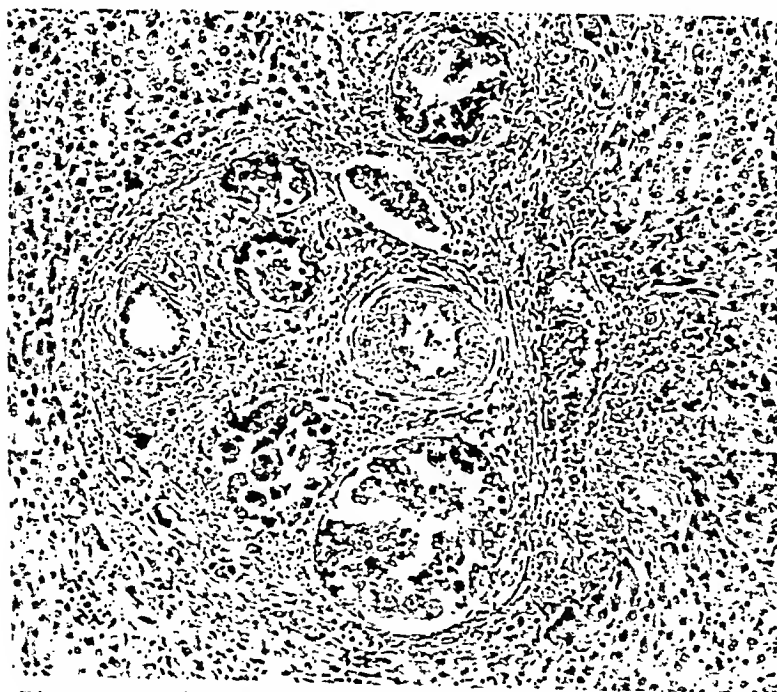
specimen revealed that the tumor also involved the left ovary, but the uterus and the right adnexa were free of tumor. The diagnosis was papillary adenocarcinoma of the left fallopian tube.

**Autopsy.** The abdomen was markedly distended and nodules were palpable in the soft tissues over the right anterior chest wall. The body cavities contained approximately 3,000 ml of fluid. There was a complete atelectasis of the right lower lobe of the lung. The visceral and parietal pleura and peritoneum were diffusely infiltrated with tumor, and metastases were found in the lungs, hilar and mediastinal lymph nodes (fig. 4), liver (fig. 5), spleen, adrenals, and para-aortic lymph nodes. The intestines were matted together into a large mass by tumor tissue extending from the pelvis. No metastases to the brain were found. The subcutaneous nodules in the right chest wall were masses of tumor tissue extending from the underlying pleura.

Microscopic examination revealed the tumor to show a papillary tendency; mitoses were quite numerous. The spread was primarily lymphangitic but blood-borne metastases were demonstrated in the lungs. These were believed to be the result of tumor emboli entering the venous system via the thoracic duct (fig. 6).



*Figure 4. Pulmonary vein completely thrombosed by tumor and masses of tumor cells within the perivascular lymphatics.*



*Figure 5. Portal space of liver showing tumor cells within lymphatics.*



Figure 6. Embolus of tumor cells within the thoracic duct.

### SUMMARY AND CONCLUSIONS

Primary carcinoma of the fallopian tube, one of the rarest of all cancers and one of the most malignant, is seldom diagnosed before operation or autopsy. The treatment of choice is bilateral salpingo-oophorectomy and wide panhysterectomy. Deep x-ray therapy is advocated to follow the operation, but its value is doubtful.

The case reported is particularly interesting because except for slight spotting the patient had none of the signs or symptoms usually associated with this condition, and was operated on primarily because of backache thought to be caused by a retroversion of the uterus.

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## NUTRITION OF THE FUTURE

"It would be rash, indeed, to make predictions of what new discoveries science may bring to nutrition in the next 5 or 10 years. My concern is that we are not applying the things that are already known. But there are three directions that seem likely to me.

"I think that the vitamin craze is just about over, and that new emphasis will be put on proteins and on minerals. It is not yet clear that all benefits of proteins derive simply from the amino acid components, but possibly another 5 years will clear up this important point. The idea of balance in the diet, which is an old one, will receive more and more attention.

"In Food Technology there have been amazing changes in recent years and we can expect many more. Most of these provide foods in some more convenient form and this is likely to be the dominating consideration rather than good nutrition. In fact, there is a constant and continuing threat to good nutrition in many technological developments, but I find it encouraging that many food companies as well as many people are conscious of this threat. The problem lies in trying to get the information we need to answer the questions raised by each technological change. These developments in technology all cost money and the cost of food must therefore tend upwards."

—L. B. PETT, M. D.  
in *Canadian Services Medical  
Journal*, p. 199, Mar. 1956

# Cholecystitis, Septicemia, and Cystitis Due to *Klebsiella Pneumoniae*

RICHARD F. HUCK, *Captain, MC, USA*

THE PATHOGENESIS of acute cholecystitis is primarily dependent on obstruction of the gall bladder, with subsequent inflammation due to chemical irritation by the concentrated bile salts. The role of bacteria in producing cholecystitis is undoubtedly secondary.<sup>1</sup> I wish to report a case of empyema of the gall bladder in which *Klebsiella pneumoniae* (Friedländer's bacillus) was isolated from the patient's urinary bladder, blood stream, and gall bladder, and to call attention again to the fact that infections of the biliary tract with the Friedländer organism are not uncommon, particularly if a primary focus of infection is present—in this instance, the genito-urinary tract.

## CASE REPORT

A 55-year-old man was admitted to this hospital in June 1955 complaining of chills, fever, right lower chest pain, and right upper abdominal pain of two weeks' duration. He had felt well until about April, when he first noted gradual loss of weight, and during the three months prior to admission he had been troubled by increasing weakness, loss of appetite, and a general feeling of being unwell. For about three days before admission, there was increasingly severe, constant pain in the right lower chest and right hypochondrium. The pain was increased on inspiration, and was so severe that it kept him awake at night. There was no history of jaundice, nausea, or vomiting. The patient did not complain of any symptoms referable to the urinary tract. He had a chronic productive cough which seemed to be a little more severe during the few days prior to admission.

The past history was significant in that the patient required a transurethral subtotal prostatectomy in 1946 for chronic bladder obstruction; subsequently, he had no difficulty in urinating.

**Physical Examination on Admission.** The patient was a well-developed, rather poorly nourished, chronically ill man in acute distress. His temperature was 103°F; pulse, 100; and blood pressure, 130/80 mm Hg. His scleras seemed to be somewhat icteric. A few transient coarse rales were heard in the right lower lung field, and the right upper quadrant of

his abdomen was tender with some voluntary guarding. A mass was felt occupying almost the entire right upper quadrant. This was soft and exquisitely tender to touch. The rest of the physical examination was not revealing.

**Laboratory Findings.** The white blood cell count was 23,000 per  $\mu$ l with a differential of 83 per cent mature neutrophils and 17 per cent lymphocytes. The red blood cells numbered 5,000,000 per  $\mu$ l and hemoglobin was 12 g per 100 ml. Grossly, the urine appeared cloudy. Urinalysis showed a specific gravity of 1.017, a trace of albumin, 0-2 finely granular casts per high power field, and an occasional red cell; white blood cells were too numerous to count in random fields. The serologic reaction for syphilis was negative. Blood urea nitrogen was 19.4 mg per 100 ml; total protein, 5.71 g; albumin, 2.95 g; and globulin, 2.76 g per 100 ml. Alkaline phosphatase was 1.15 Bodansky units per 100 ml; thymol turbidity, 7.5 units; cephalin-cholesterol flocculation, 2 plus in 48 hours. A catheterized urine culture revealed *K. pneumoniae* and *Escherichia coli*. A blood culture showed *K. pneumoniae*, and sensitivity studies indicated that the organism was inhibited by Chloromycetin (brand of chloramphenicol) but showed no sensitivity to streptomycin sulfate, Terramycin (brand of oxytetracycline), penicillin, or bacitracin, and poor sensitivity to chlortetracycline hydrochloride (aureomycin). The strain of *Klebsiella* isolated from his urine demonstrated the same sensitivities. A sputum culture grew coagulase-negative *Micrococcus pyogenes* var. *aureus*.

**Roentgenographic Findings.** A roentgenogram of the chest was essentially noncontributory. A cholecystogram failed to show the gall bladder but on fluoroscopic examination, a mass, thought to be an enlarged gall bladder, was observed.

**Course in Hospital.** Although the results of the bacteriological studies were not known at the time, the patient was immediately placed on chlortetracycline hydrochloride, 500 mg initially and then 250 mg four times a day, and given Demerol (brand of meperidine hydrochloride) as needed for his discomfort. A residual urine determination revealed only 33 ml of urine.

During the first week of hospitalization, the patient subjectively improved on chlortetracycline hydrochloride therapy, but his temperature continued to spike, ranging from 100° to 100.8°F. This continued well into the second week of hospitalization. Ten days after the patient's admission to the hospital the culture reports were returned with the results noted above. By this time he had clinically improved to such extent that his white blood cell count had dropped from 18,000 per  $\mu$ l on the fifth day of admission to normal two days later.

The patient continued to improve, and on 11 July an exploratory laparotomy was performed at which time it was found that the gall bladder had been isolated by a large mass of omentum that was firmly adherent to the upper surface of the liver. A large gall bladder was



exposed which contained approximately 300 ml of purulent liquid and many small and large stones. The common duct was dilated, and aspiration revealed a small amount of bile but no calculi. Further exploration of the common duct revealed no other abnormalities. Because of the edema in the area of the junction of the cystic and common ducts, a cholecystostomy was performed, with removal of all of the stones. The gall bladder was irrigated thoroughly and a large mushroom catheter was sutured into it. Culture of the bile revealed *K. pneumoniae* sensitive to Chloromycetin. A postoperative cholangiogram demonstrated the contrasting material to pass freely through the external catheter and the T tube, filling the gall bladder and biliary duct system. The contrast material entered the proximate loops of the duodenum without any difficulty, indicating no obstruction or stones to be present.

The patient did well postoperatively and was discharged from the hospital on 21 July to return at a later date for cholecystectomy. He was readmitted in acute distress on 30 July, complaining of chills and fever and of severe pain in the right upper quadrant. It was believed that the T tube, which had been left in situ, had become obstructed and there was not adequate drainage of bile, resulting in recurrence of his acute cholecystitis. Chloromycetin was reinstituted, and drainage through the tube was re-established.

The patient responded well to treatment, and six weeks after admission to the hospital, the old incision was opened, the gall bladder removed without difficulty, and the common duct explored. No stones were found in the common duct and the T tube was placed in it. Ten days postoperatively the T tube was removed, after cholangiography had revealed a normal appearing common duct. Slight dehiscence of the operative wound developed, probably secondary to an infection, but this healed rapidly. The patient has been followed during the past eight months in the outpatient clinic. He is feeling well and has regained his weight and strength.

### DISCUSSION

Baehr, Schwartzman, and Greenspan,<sup>2</sup> in reviewing 198 cases of infections due to Friedländer's bacillus reported over a 75-year period, contradicted the idea that the organism affects primarily the respiratory tract. They found that respiratory tract and lung infections actually were of less common occurrence than were gastro-intestinal infections. Furthermore, they pointed out that many strains of *Klebsiella* organisms form acid and gas in the identical sugar media that *Esch. coli* strains do; thus, a capsule stain is frequently indicated to differentiate the two. They found that infection of the gall bladder or biliary passage due to Friedländer's bacillus occurred without any obvious predisposing cause in only 6 of 43 patients with cholecystitis and cholangitis.

The occurrence of cholangitis, pylephlebitis, and liver abscesses secondary to infection of the gall bladder accounted for 30 per cent of the deaths. Bacteremia occurred as frequently from infection of the gastro-intestinal tract as from that of the urinary tract.

It is well known that the clinical response of a given patient to an antibiotic may not correlate well with the in vitro sensitivity of the isolated organism to different concentrations of the various therapeutic agents. Our patient responded well to chlorotetracycline hydrochloride clinically, although the laboratory reported poor sensitivity of the strain in question to this antibiotic in vitro. Hall<sup>3</sup> demonstrated that chlortetracycline hydrochloride is found in the bile in high concentration—8 to 16 times the corresponding serum concentration; this happy circumstance may account in part for our patient's improvement. With respect to Chloromycetin, Gruhitz and co-workers<sup>4</sup> found that it entered the gall bladder in significant concentrations, a fact of clinical importance in treating patients with acute infections of the gall bladder prior to surgical intervention when the complicating organism is not known.

Cabelli and Goldberg<sup>5</sup> in purely in vitro sensitivity studies of the various *Klebsiella pneumoniae* strains, noted a definite correlation between a given strain's ability to ferment lactose and its general resistance to antibiotics. Neomycin and polymixin B were most effective in inhibiting the various strains of the organism, but because of the poor absorption of neomycin<sup>6</sup> and the toxicity of polymixin B, neither of these drugs would have been of practical value in management of the patient described above.

The statement of Bell<sup>7</sup> regarding the specific therapy of meningitis due to Friedländer's bacillus is applicable to empyema of the gall bladder and septicemia due to the same organism; namely, that no one antibiotic or combination of antibiotics is uniformly effective. In addition, it must be emphasized that surgical intervention and drainage or removal of the focus of infection is necessary for complete eradication of the disease.

#### SUMMARY

A case of empyema of the gall bladder, septicemia, and chronic cystitis due to *Klebsiella pneumoniae* (Friedländer's bacillus) is presented. Review of the literature reveals two interesting findings: (1) That cholecystitis caused by *K. pneumoniae* may not be a rare occurrence, particularly if the gall bladder is already diseased and a chronic Friedländer's infection is present elsewhere, and (2) that no single antibiotic is uniformly effective against this organism. For complete cure, surgical drainage or removal of the focus of infection is indicated.

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## EDUCATION vs INSTRUCTION

"In the kind of teaching we give in universities, a distinction may properly be drawn between the processes of education and instruction. In education, the student is encouraged to work and think for himself; the function of the teacher is to stimulate and criticize. Education is expensive in time and effort of both teachers and pupils. But it produces the most finely trained minds. By contrast, instruction is a process whereby the student is required to assimilate a series of dicta, without inquiring into their validity or necessarily considering the evidence on which they are based. It is a process which does not necessarily improve the mind of the recipient, and may actually do harm by suppressing curiosity, insight, and the capacity to learn from experience."

—GEORGE W. PICKERING, M. D.  
in *Annals of Internal Medicine*  
p. 924, Nov. 1955

# Essential Renal Hematuria

MAYNARD A. MESERVEY, *Lieutenant, MC, USNR*  
LOUIS J. SCORDAMAGLIA, *Lieutenant, MC, USNR*

**I**N REVIEWING case reports on essential renal hematuria, one is impressed by the large percentage of these which, on pathologic study, show the bleeding to be coming from venous anomalies or angiomas of the renal pyramids. Strictly speaking the term "essential" should not be used in any case where the cause of bleeding is discovered, but through common usage it is applied to obscure cases of hematuria that may eventually be shown to have arisen from a specific lesion. Webb-Johnson and Warwick<sup>1</sup> believed that bleeding from one kidney in the absence of evidence of nephritis is almost invariably due to angiomas of the pyramids, and condemned use of the term "essential" in these cases. McKay, Baird, and Lynch<sup>2</sup> stated that angiomas or varices are frequently found in the presence of severe interstitial pyelonephritis, and suggested that these may be due to inflammation and fibrosis with impairment of venous return. They proposed that the term "hamartoma" be used for these vascular tumors. Bobbitt, Hoffman, and Werthammer<sup>3</sup> listed three possible causes for "essential" hematuria: (1) acute or chronic inflammatory, (2) fibrotic, and (3) vascular. They cited two cases in which varices of the renal pyramids were thought to be due to a congenital weakness of the vessels as there was no evidence of fibrosis or nephritis.

Priestley and Wilbur,<sup>4</sup> in a study of essential hematuria, noted changes in the renal pyramids of all 10 kidneys examined histologically. The findings consisted of vascular changes in which the pyramidal veins showed marked congestion, often with associated hemorrhage; both acute and chronic inflammatory changes; and in the late stages, fibrosis. Recently MacMahon and Latorraca<sup>5</sup> reported three cases of "essential" hematuria due to a lesion until then incompletely described. They noted direct communicating channels between pericalyceal venous sinuses, and the minor calyces of the collecting system of kidneys which were otherwise normal, and in which no other possible cause for bleeding could be demonstrated. Nephrectomy was performed on each of these patients as a lifesaving measure, and in each case it had been the first bleeding episode. To the latter is attributed the clear histologic picture without inflammation or reactive fibrosis.

From U. S. Naval Hospital, Newport, R. I. Dr. Meservey is now at Mercy Hospital, Des Moines, Iowa.

MacMahon and Latorraca believed that hemorrhage of the degree noted in these cases cannot be readily explained by capillary bleeding or diapedesis, but must indicate the rupture of a larger vessel.

A case has recently been observed by us which, because of its similarity to those reported by MacMahon and Latorraca and because of the scarcity of other such cases in the literature, is herein reported.

### CASE REPORT

A 69-year-old woman entered the hospital because of painless, gross hematuria of three days' duration. There was no history of trauma or lower urinary tract symptoms. Physical examination was normal except for an iridectomy scar of the right eye and absence of the left breast which the patient said had been removed 25 years previously because of cancer. Blood pressure, pulse, and temperature were normal on admission. Urinalysis showed a specific gravity of 1.014; acid reaction; albumin, 15 mg per 100 ml (one specimen) and no glucosuria. Hemoglobin was 14.5 g per 100 ml; the white blood cell count was 6,500 per  $\mu$ l with 54 per cent neutrophils, 41 per cent lymphocytes, and 5 per cent eosinophils. Sedimentation rate (Cutler) was 4 mm/hr. Platelet count was 389,450 per  $\mu$ l; bleeding time (Duke), 3 min 30 sec; coagulation time (Lee and White), 3 min 40 sec. Prothrombin time was 80 per cent of normal. The Kahn test was negative. A roentgenogram of the chest and an electrocardiogram were normal. Intravenous pyelograms were unsatisfactory due to poor visualization of right collecting system. Retrograde cystography disclosed blood spurting from right urethral orifice. Retrograde roentgenograms showed a normal left kidney collecting system. The outline of the right kidney was normal but there was an irregular filling defect involving the lower calyx (fig. 1). During the hospital course the gross hematuria lessened to a pink tinge. Because of the history and roentgenographic findings suggestive of neoplasm, a right nephrectomy was performed. The post-operative course was uneventful.

**Pathologist's Report.** The specimen consisted of a symmetrical kidney weighing 135 grams with the renal pelvis and 8 cm of attached ureter. There were no capsular adhesions and the cortical surface was smooth. When the specimen was bisected, the pelvic mucosa was noted to be diffusely congested and there were small blood clots loosely adherent to the mucosal surface. Multiple parallel sections perpendicular to the capsular surface and at 3-mm intervals were made. One of these cuts chanced to pass through a small hemorrhagic zone adjacent to a papilla. Histologically a section of this area showed a direct communication between the fornix of a minor calyx and an adjacent pericalyceal venous sinus. A blood clot showing early organization with fibroblastic and capillary ingrowth from the vessel wall extended a short distance into the fornix at this point (fig. 2). In the perivascular



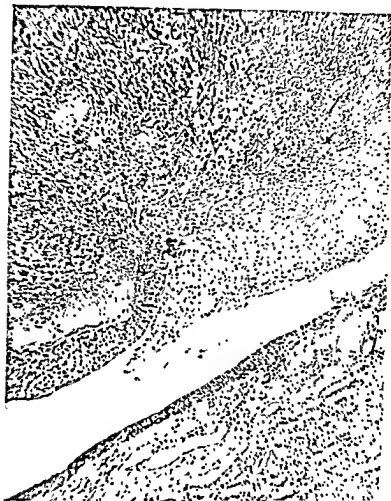
*Figure 1. Retrograde pyelogram showing filling defect of lower calyx of right kidney.*

tissue there was a striking degree of fresh hemorrhage accounting for the submucosal congestion of the pelvis noted in the gross examination. A slight infiltration of neutrophils and lymphocytes was noted in the hemorrhagic area, but there was no evidence of inflammation or fibrosis elsewhere in the kidney. There was no tumor, and all other sections of the kidney were remarkably normal.

#### DISCUSSION

This case differs from those reported by MacMahon and Latorraca only in the finding of a blood clot within the communicating channel between vessel and collecting system. This is presumed to be the result of the usual clotting mechanisms, and in the absence of abnormal coagulation factors or demonstrable vascular changes cannot be considered otherwise. Furthermore, it is entirely possible that the blood clot formed in situ might have in time completely arrested the hemorrhage and permitted healing to ensue. Perhaps other cases of hematuria, transitory in nature and subsiding without surgical intervention, may have done so by this means.

In retrospect it is difficult to see how this case could have been handled differently. Indications for nephrectomy, even



*Figure 2. Photomicrograph showing the connecting channel between a minor calyx and a pericalyceal sinus. Note the organizing blood clot extending into the calyx. ( $\times 50$ )*

though the preoperative diagnosis was incorrect, were subsequently proved to be valid. The factor initiating hemorrhage in these cases still remains obscure. We can only reiterate MacMahon and Latorraca's statement, "In the absence of these (tumor, stone, or inflammatory erosions), simple anatomical relationships and physiological variants in pressure could initiate massive, recurrent hematuria."

#### SUMMARY

Another case of obscure hematuria has been explained by the demonstration of a communicating channel between a pericalyceal venous sinus and a minor calyx of the urine collecting system.

In this case, unlike others previously reported, there is a thrombus partially occluding this channel. The possibility is raised that the thrombus might have eventually arrested the hemorrhage, and it is believed that thrombus formation in such lesions may in some cases account for the spontaneous remission of transitory, undiagnosed hematuria.

It is to be hoped that kidneys removed surgically for obscure hematuria will be most carefully examined with the foregoing lesion in mind before they are diagnosed as normal. The frequency of this finding will undoubtedly be in direct relation to the awareness of it.

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#### TIME TO THINK

"In more general terms, the medical curriculum should be like a well-ordered atom; aside from a compact and weighty nucleus, it should consist largely of space.

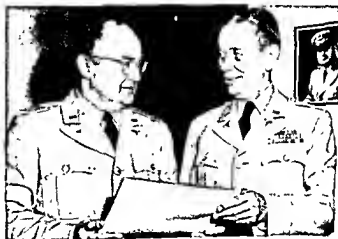
"The most precious quantities that we can give our students are the time and the freedom to develop as human beings and as physicians. It will be assumed that the time is free only in the sense that it will be unassigned. It will be available for thinking and reading, not simply the latest texts, but Darwin, or Proust, or the Bible, or the new journals; or for advanced elective work; or for the pursuit of a special interest in the laboratory. The medical school should fit a description quite the opposite of that which has been quoted for the old proprietary schools: the student should see even more than he hears, and, above all, he should do everything."

—AVERILL A. LIEBOW, M. D.  
in *British Medical Journal*  
p. 397, Feb. 11, 1956



### CITATION PRAISES LT. COL. McDOWELL

Lieutenant Colonel Marion E. McDowell, MC, USA, formerly director of the Division of Medicine at the Walter Reed Army Institute of Research, Walter Reed Army Medical Center, Washington, D. C., has been awarded a Certificate of Achievement for his "... outstanding record of service well rendered" to his country. Signed by Major General Leonard D. Heaton, Commanding General of Walter Reed Army Medical Center, the citation praised Colonel McDowell for his contributions in Korea "to the understanding of the complex problems of shock and renal failure in hemorrhagic fever" as well as for his "steadfast devotion to duty at Walter Reed Army Medical Center." Brigadier General John R. Wood, director of the Institute, presented the citation to Colonel McDowell at Center Headquarters on 2 July 1956. Colonel McDowell's next assignment will be at the Tokyo Army Hospital.



*Lt. Col. Marion E. McDowell, MC, USA (left) receives a citation from Brig. Gen. John R. Wood, Commandant of the Walter Reed Army Institute of Research. Col. McDowell, former Director of the Division of Medicine at the Institute, left Walter Reed on 10 July 1956 for duty at Tokyo Army Hospital.*

A 1942 graduate of the University of Wyoming, Colonel McDowell received his Doctor of Medicine degree in 1945 from the University of Rochester School of Medicine. He entered the service in 1943 and in 1952 served in Korea with a medical research team.

Colonel McDowell is a member of Phi Beta Kappa, an associate member of the American College of Physicians, a member of the American Medical Association and the American Federation for Clinical Research, and certified by the American Board of Internal Medicine

## A MESSAGE FROM THE A. M. A.

The "message" this month is devoted to the A. M. A. Public Relations Department. Within the past 10 years the American Medical Association has taken on a new look. The changes, reflected in a more dynamic organizational "personality," stem from new concepts of thinking within the Association.

The Association's Public Relations Department, whose director serves as assistant to the Secretary-General Manager, has been charged with the implementation of a program designed to clear away misunderstandings about doctors, to right any actual wrongs within the profession, and to foster the friendship and support of the American people. There are three keynotes to departmental activities: (1) evaluation of all developments in the medical world, scientific as well as socio-economic; (2) education of both public and profession in regard to these developments as well as in regard to the values of our present medical care system and ways to improve it; and (3) action to eliminate areas of misunderstanding and pave the way for improved medical service. Some of the department's specific activities include:

*Press relations.* Each week a new release based on stories in the *Journal of the American Medical Association* or in special journals is issued to newspapers, magazines, and radio and television stations around the country. In advance of the A. M. A.'s two large scientific meetings each year, dozens of releases based on abstracts of scientific papers are prepared, and during the meeting itself two press rooms are maintained to service the more than 100 reporters who attend. Throughout the year special coverage is given to various meetings of A. M. A. councils and committees, and special articles are prepared for trade journals and related publications. In addition to providing a steady flow of scientific information, the press relations section publicizes organized medicine's policies on national legislation and other medical issues of public concern.

*Magazine relations.* Since almost 500 medical articles a year appear in nationally circulated magazines, the department offers a special review and consultation service to editors and writers to insure accuracy of articles that appear. A weekly *J. A. M. A.* column is prepared which summarizes current magazine articles of medical interest and also reports on medical TV shows.

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From the Council on National Defense of the American Medical Association. The views and opinions expressed are not necessarily those of the Department of Defense.  
—Editor

*Television and films.* In the last two years, two TV films were prepared by the A. M. A.—“A Life to Save,” pointing out the dangers of medical quackery, and “Operation Herbert,” discussing medical costs. Currently another film is in production. This will highlight the values of the art of medicine. Other films, many produced in co-operation with the A. M. A., are widely publicized by the Association. Just recently a Physicians' Advisory Committee for Television, Radio, and Motion Pictures operating on the west coast, and another operating on the east coast, were set up to serve producers and writers of shows on medical subjects.

*Literature.* During 1955 the Department distributed nearly a million and a half pamphlets, reprints, and similar literature for public consumption. These pieces were generally “educational,” pointing out the importance of getting a family doctor, giving the facts on medical education today, explaining the Association's legislative stands, and covering many other significant subjects. The newest publication is one on mechanical quackery, prepared in co-operation with the A. M. A. Bureau of Investigation. One 1955 leaflet, entitled “To All My Patients,” has been distributed by physicians to nearly three million patients.

*Internal public relations.* A great deal of the Department's activities are with physicians and medical societies, to aid them in building good individual and society public relations programs. A 1955 nation-wide public opinion survey revealed that the areas needing concerted attention were mainly those in which the A. M. A. had been exerting its major public relations efforts. For example, the Association has made great progress in getting county societies to set up night and emergency telephone answering services to insure round-the-clock availability of medical care, to establish grievance committees to hear patients' complaints, and to conduct other public service-type projects. The Department counsels societies on ways to improve public relations, and provides for their use a number of loan packets on specific public relations projects.

Special Public Relations Department activities include services to the Association's president and president-elect in press coverage and speech preparation, handling of arrangements for the President's Inaugural Ceremony at the Annual Session, holding of a Public Relations Institute each fall to discuss problems and techniques, promotion of such special events as Medical Education Week, high school science fairs, and Community Health Week, liaison with women's organizations, and a host of other projects in the public relations realm.

## LEGION OF MERIT AWARD TO COL. ZELLER



*On the occasion of her retirement, Colonel Verena M. Zeller, USAF (NC), is presented the Legion of Merit for "exceptionally meritorious conduct in the performance of outstanding services," by Major General Dan C. Ogle, the Air Force Surgeon General. Colonel Zeller retired 1 July 1956, after more than 20 years' active service, being the first Chief Nurse of the U. S. Air Force Medical Service. Witnessing this ceremony were members of General Ogle's staff—Colonel Russell S. Leone, USAF (MC), Brigadier General Olin F. McIlroy, USAF (MC), and Major General William H. Powell, Jr., the Deputy Surgeon General of the Air Force.*

## DEATHS

- EASLY, Philip Howard, Lieutenant (jg), MC, USNR, of Elyria, Ohio; stationed at U. S. Naval Hospital, St. Albans, N. Y.; graduated in 1954 from St. Louis University School of Medicine, St. Louis, Mo.; commissioned an ensign 11 September 1945; ordered to active duty 6 July 1956; died 19 July 1956, age 32, at St. Albans, N. Y., of coronary thrombosis.
- FRENCH, Marguerite Yvonne, Lieutenant (jg), NC, USNR, of Pass Christian, Miss.; stationed at Commander Fleet Activity, Sasebo, Japan; graduated in 1951 from the Southern Baptist Hospital School of Nursing, New Orleans, La.; appointed an Ensign 3 September 1953; ordered to active duty 23 November 1953; died 30 April 1956, age 25, at the Station Hospital, Sasebo, Japan.
- HALLER, Ralph Albright, Major, MSC, USAR, of Ephrata, Pa.; stationed at Valley Forge Army Hospital, Phoenixville, Pa.; discharged from enlisted status 17 September 1942; appointed a Second Lieutenant and ordered to active duty 18 September 1942; died 25 May 1956, age 44, at Valley Forge Army Hospital, of lymphosarcoma.
- LAWRENCE, Richard Wason, Captain, DC, USNR, of Manchester, New Hampshire; stationed on the U. S. S. *Hornet*; graduated in 1933 from Harvard University Dental School; appointed a Lieutenant in the Naval Reserve on 28 July 1936; ordered to active duty 30 November 1942; released to inactive duty in July 1946 and returned to active duty in 1950; died 28 April 1956, age 46, at the U. S. Naval Hospital, San Diego, Calif., of an occipitotemporal abscess.
- MILLER, Walter Paul, Captain, MSC, USAR, of Johnstown, Pa.; stationed at the 7th Evacuation Hospital, Germany; appointed a Second Lieutenant 25 April 1949; discharged from enlisted status 27 June 1949, ordered to active duty as a Second Lieutenant 28 June 1949; died 15 May 1956, age 39, in Germany, of coronary thrombosis.

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MEDICAL-DENTAL MILITARY SYMPOSIUM

A combined Armed Forces Medical-Dental Military Symposium will be held at the U. S. Naval Hospital, Great Lakes, Ill., from 26 to 28 September 1956. The program is being planned to include top-level medical personnel from all of the Armed Forces, and representation will be made by the Surgeons General of the Navy, Army, and Air Force and from the Office of the Assistant Secretary of Defense (Health and Medical). Exhibits and scientific programs will be presented and displayed throughout the three-day symposium. Retirement point credits will be given to all eligible Reserve Medical Department Officers who attend.

Inquiries concerning this symposium should be addressed to: Commandant, Ninth Naval District, Attention: Code 46S, Building 1, Great Lakes, Ill.



# MEDICAL CORPS—Continued

SCOTT, Wilson R., Maj, USA  
SEITZMAN, David M., Capt, USA  
SIEBER, Paul E., Maj, USA  
SMITH, Stuart G., Brig. Gen., USA  
SNYDER, Dale R., Capt, USA  
SCRENSON, Roger W., Capt, USA  
SPROAT, Harry F., Maj, USA  
STORY, Stratton R., Capt, USA  
SUMMERSON, Donald J., Maj, USA  
THORPE, James R., 1st Lt, USAF  
TKACK, Walter R., Maj, USAF

TREDICI, Thomas J., Capt, USAF  
TURNER, William R., Maj, USAF  
VIVONA, Stefano, Maj, USA  
WAYMAN, George A., Capt, USA  
WEINSTEIN, David B., Capt, USA  
WHELAN, Thomas J., Jr, Maj, USA  
WHYTCOME, David T., Capt, USA  
WILLIAMS, Marion J., 1st Lt, USAF  
WISLOW, Donald J., Maj, USA  
WOLFE, Walter Mel, Maj, USA  
WONRALL, Joseph A., Jr, Maj, USA

## DENTAL CORPS

BARTON, John A., Jr, 1st Lt, USAF  
BEDELMAN, Edward R., Capt, USAF  
BROWN, Arthur L., Brig. Gen., USA  
JAGGERS, Joe R., Capt, USA  
JOYCE, Rex D., Capt, USA  
KLAESER, Ray L., 1st Lt, USAF

MARTIN, Edward R., Capt, USAF  
PAVLKOWSKI, Fred L., 1st Lt, USAF  
SCHWARTZ, Donald E., Capt, USA  
SCHWINGHAUSEN, William L., Col, USA  
STEPHENS, Nelson S., 1st Lt, USAF  
SWANSON, Raymond W., Lt. Col, USA

## MEDICAL SERVICE CORPS

BENADE, Leo E., Lt. Col, USA  
BORUFF, Marilyn W., Capt, USAF  
CARROLL, Nicholas V., Capt, USA  
CLAPP, Marshall W., Capt, USA  
COX, Sidney D., Jr, Maj, USAF  
DAVIS, William V., Capt, USA  
DIBONA, Philip, Capt, USAF  
EGGETT, Earl H., Lt. Col, USAF  
FLATTER, Findlay F., Maj, USA  
HAIGLER, Steven V., Jr, Maj, USAF  
HODGE, Joseph E., Capt, USAF  
HOLLIDAY, Robert L., Capt, USAF  
LARUE, Jack, Maj, USAF

LINDSAY, Eugene K., Capt, USAF  
LYSAF, William, Capt, USA  
MCINTOSH, Edly B., Lt. Col, USAF  
MOTLEY, Dehamas, Maj, USAF  
PARKER, James W., Capt, USA  
PARSONS, Frank R., Jr, 1st Lt, USAF  
FLOCK, William L., Lt. Col, USAF  
SPENCER, Ralph A., Capt, USA  
TURNBULL, Samuel J., Jr, Capt, USA  
TURNER, Richard A., Maj, USAF  
WILLIAMS, Benjamin H., 1st Lt, USAF  
YOUNG, Claudia E., Capt, USA

## ARMY & AIR FORCE MEDICAL SPECIALIST CORPS

ADAMS, Rachel R., Capt, USA  
ANDERSON, Marilyn J., Capt, USA  
BARNES, Joan A., Capt, USA  
PEARSON, Florence M., Capt, USA  
CHASKA, Shirley M., 1st Lt, USAF  
HENSON, Nellie A., Capt, USA  
KEEGAN, Nanette G., Capt, USA  
KERCE, Myrna H., Capt, USA  
KINNTON, Dorothy M., Capt, USA  
LAIKOPORTSCH, Elizabeth L., Capt, USA

LEATH, Mary K., Capt, USA  
MENDLER, Helen M., Capt, USA  
FERRY, Joan R., Capt, USA  
PETERSON, Dorothy J., Capt, USA  
RADER, Marjorie A., Lt. Col, USAF  
REYNOLDS, Cora D., Capt, USA  
WAKEFIELD, Patricia, Capt, USA  
WESTROVEN, Mary F., Capt, USA  
WITTE, Eileen B., Capt, USA

## NURSE CORPS

ALLEN, Virginia M., 1st Lt, USAF  
ARCHER, Joan D., Capt, USA  
AYCOCK, Erlene T., Capt, USA  
AYNES, Edith A., Maj, USA  
BAGLEY, Irene C., 1st Lt, USAF  
BATES, Modena L., 1st Lt, USAF  
BETZOLD, Margery E., 1st Lt, USAF  
BRADLEY, Mary L., Capt, USA  
BROCKMER, Margaret M., Capt, USA  
CARROLL, Felene D., Capt, USA  
CASEY, Marguerite C., Capt, USA  
CHAMBERLING, Mary A., 1st Lt, USAF  
CHANDLER, Glenna L., Capt, USAF  
CHRISTENSEN, Donna M., Capt, USA  
COFFMAN, Catherine A., Maj, USAF  
COLLAVO, Laverine M., 1st Lt, USAF  
COCK, Margaret, Capt, USA  
DEAN, Martha, Capt, USA  
DEJESUS-CRUZ, Maria, 1st Lt, USAF  
DELANEY, Ramona E., Capt, USA  
DUNNUM, Dolores L., Lt. Col, USAF  
DUPLASSE, Margaret L., Lt. Col, USAF  
ECKHOFF, Genevieve E., Capt, USA  
ELSER, Florence F., Capt, USAF  
EVERETT, Anna E., Capt, USA  
FARLAND, Vivian, Capt, USA

FRATZER, Doris S., Capt, USA  
FENNEY, Jean P., Capt, USA  
FISHER, Jackie V., 2d Lt, USAF  
GADDIS, Marie C., Maj, USAF  
GAUGLER, Anita L., Capt, USA  
GIELDGETH, Betty M., Capt, USA  
GIBBES, Miriam K., Capt, USA  
GIBBS, Ethel F., Capt, USA  
HILL, Louise, Capt, USA  
HORTON, Virginia A., Capt, USA  
HOUSE, Rosemary, Capt, USA  
HOUSEKNECHT, Edith M., Capt, USA  
HOWLE, Juanita, 1st Lt, USAF  
JABLONOVSKY, Anne C., Capt, USA  
JACOEY, Jane E., Capt, USA  
JANKOWSKI, Josephine J., Capt, USA  
JOHNSON, Elizabeth F., Capt, USA  
KAKE, Helen H., Capt, USA  
KELLAM, Agnes L., 1st Lt, USAF  
KOENIG, Kathryn A., Capt, USA  
LABLANC, Claire V., Capt, USA  
LEVANGIE, Catherine L., Capt, USA  
LIEBOWITZ, Ethel, Capt, USA  
LOUCKS, Feryl S., Capt, USA  
LYNCH, Emily R., Capt, USA  
MALEJICZ, Wanda, Capt, USA

# NURSE CORPS—Continued

MARTA, Katherine M., Capt., USA  
 MCKINNEY, Frances L. T., Capt., USA  
 MORIN, Felice R., Capt., USA  
 OWEN, Louella, Maj., USA  
 PAK, Regina, Capt., USA  
 PICKETT, Natalie A., 1st Lt., USAF  
 PLILER, Vivian L., Capt., USA  
 PORTER, Nan L., Capt., USAF  
 PRATT, Ruth A., 2d Lt., USAF  
 QUINN, Mary C., Capt., USA  
 REID, Kay M., Capt., USA  
 ROCCOVICH, Dorothy J., Capt., USA  
 RUHE, Carolyn H., Capt., USAF  
 RYAN, Patricia A., Capt., USA  
 SAMMONS, Nadine G., Capt., USA

SCHIFFMAN, Regina H., Capt., USA  
 SCHNEIDER, Patricia M., Capt., USA  
 SETTER, Marian J., Capt., USA  
 SHERTZER, Joanne L., 1st Lt., USAF  
 SHIELDS, Marian C., Capt., USA  
 SMITH, Nancy V., Capt., USA  
 STARKEY, Elizabeth J., Capt., USA  
 SULPIZIO, Virginia M., Capt., USA  
 VANDIVER, Frances O., Capt., USA  
 VLAHOVICH, Fanny E., Maj., USA  
 VSETULA, Josephine M., Lt. Col., USAF  
 WILEY, Jane R., Capt., USA  
 WILSON, Ruth A., Capt., USA  
 WORKMAN, Betty J., Lt. Col., USAF

## VETERINARY CORPS

COLLINS, Warren E., Maj., USAF  
 GANAWAY, James R., 1st Lt., USAF

HAYS, William L., Capt., USA  
 WATSON, William H., Jr., Capt., USAF

The following officers of the military medical services on active duty in the Army and Air Force have recently received temporary promotions to the rank indicated.

## MEDICAL CORPS

ABRAHAMS, Samuel, Capt., USAF  
 AKERS, William A., Capt., USAF  
 APPEN, Raymond C., Capt., USAF  
 ARMSTEAD, J. W., Jr., Capt., USAF  
 BARATTA, Philip A., Jr., Capt., USAF  
 BARSANTI, Ronald G., Capt., USAF  
 BATEMAN, John J., Capt., USA  
 BAUER, August R., Jr., Capt., USAF  
 BECKER, Stanley M., Capt., USA  
 BELL, Ross O., Jr., Capt., USAF  
 BELZA, Janusz, Capt., USA  
 BORTZ, Allen I., Capt., USAF  
 BOYAJIAN, Albert, Capt., USAF  
 BRAUCHER, R. E., Capt., USA  
 BRODY, Jerome I., Capt., USAF  
 BROWN, Coleman M., Capt., USAF  
 BROWN, William C., Capt., USAF  
 BRUCE, Gerald A., Capt., USA  
 BUGG, James W., Capt., USAF  
 BURKART, O. G., Jr., Capt., USA  
 BURKHALTER, William E., Capt., USAF  
 BURKO, Henry, Capt., USAF  
 CALLOWAY, William C., Capt., USAF  
 CAPLAN, Harold E., Capt., USAF  
 CARMODY, Everett J., Capt., USA  
 CASKEY, Charles J., Capt., USA  
 COHEN, Stanley N., Capt., USAF  
 CONE, Lawrence A., Capt., USA  
 COTTEN, Stonie R., Capt., USAF  
 CZERNOBILSKY, Bernhard, Capt., USAF  
 DANIEL, William T., Capt., USAF  
 DAWSON, David F., Capt., USA  
 DCMINGCS, William R., Capt., USAF  
 DRESSLER, Donald P., Capt., USA  
 DRISKILL, William L., Capt., USAF  
 DUNLAP, Jack E., Capt., USA  
 DYE, William B., Capt., USAF  
 EVANS, William C., Jr., Capt., USA  
 FARMER, Billy L., Capt., USAF  
 FERNMAN, Maxwell C., Capt., USAF  
 FENSTERMACHER, J. M., Capt., USAF  
 FERGUSON, John S., Jr., Capt., USAF  
 FIENE, Lawrence C., Capt., USAF  
 FINGERHUT, Aaron G., Capt., USAF  
 FLEMING, Burton A., Capt., USAF  
 FCURNET, James J., Capt., USA  
 FRIC, Ralph E., Capt., USAF  
 GANGERCSA, Eugene J., Capt., USA  
 GARNISH, Richard A., Capt., USAF

GATTI, Robert R., Capt., USA  
 GILL, Nicholas P., Capt., USAF  
 GILMAN, George C., Capt., USAF  
 GONZALEZ, Louis F., Capt., USAF  
 GRIFONE, James W., Capt., USAF  
 GROSHONG, David L., Capt., USAF  
 GROSS, Charles M., Capt., USAF  
 HARRIS, Barton A., Capt., USAF  
 HATFIELD, John R., Capt., USAF  
 HENDERSON, Jesse T., Jr., Capt., USAF  
 HENDLEMAN, Leonard, Capt., USAF  
 HENDRICKS, H. H., Capt., USAF  
 HILLMAN, Charles H., Capt., USAF  
 HITTNER, Harry R., Capt., USAF  
 HOOD, Christopher K., Capt., USAF  
 HOWARD, Elliott J., Capt., USAF  
 HUDSON, Thomas L., Capt., USAF  
 HUMMEL, Robert P., Jr., Capt., USAF  
 HUNTER, Harry H., Capt., USAF  
 JENSEN, Warren R., Capt., USAF  
 KAPLAN, Martin P., Capt., USAF  
 KELSCH, Robert C., Capt., USAF  
 KENASTON, T. C., Jr., Capt., USAF  
 KNOWLES, John A., Jr., Capt., USAF  
 KNOWLES, William R., Capt., USAF  
 KOEING, Robert P., Capt., USAF  
 KVETON, Frank W., Capt., USAF  
 LAHTI, Richard E., Capt., USAF  
 LAUER, Kurt E., Capt., USAF  
 LAYCOCK, Royce, Capt., USAF  
 LEDER, Archie A., Capt., USAF  
 LICHTENSTEIN, R. S., Capt., USAF  
 LIGGETT, Arthur S., Capt., USAF  
 LINDAHL, James B., Capt., USAF  
 LINDESMITH, George G., Capt., USAF  
 LUEKENS, C. A., Jr., Capt., USAF  
 MAHER, John F., Capt., USAF  
 MALONEY, Donald W., Capt., USAF  
 MALOOLY, Donald A., Capt., USAF  
 MANDELL, Gerald H., Capt., USAF  
 MANNS, Robert L., Capt., USAF  
 MARILLEY, Ralph J., Capt., USAF  
 MASON, Arthur D., Jr., Capt., USAF  
 MASON, Rhondal, Capt., USAF  
 McCUTCHEON, F. B., Capt., USAF  
 McKEAN, Donald E., Capt., USAF  
 MEDINA, Jose T., Capt., USAF  
 MEISELAS, Harold, Capt., USAF  
 MEISTER, Donald G., Capt., USAF



# MEDICAL CORPS—Continued

MELE, Howard S., Capt., USAF  
MORGAN, Royce H., Capt., USAF  
OBENOUR, Sterling W., Jr., Capt., USAF  
CLIX, Melvin L., Capt., USAF  
OWENS, William F., Jr., Capt., USAF  
PAPPAS, Peter, Jr., Capt., USAF  
PARKER, Lee B., Jr., Capt., USAF  
PATMONT, Jerome R., Capt., USAF  
FENCE, Eldon D., Jr., Capt., USAF  
PHILLIPS, Robert S., Capt., USAF  
FREVOGT, Robert V., Jr., Capt., USAF  
FUCKETT, William N., Capt., USAF  
RABKE, Henry B., Capt., USAF  
REDA, Frank A., Capt., USAF  
REEM, Bernard M., Capt., USAF  
ROGNER, Henry, Capt., USAF  
RUBIN, Robert, Capt., USAF  
RUBRIGHT, Herbert C., Capt., USAF  
SALTER, Edwin C., Capt., USAF  
SATLZMAN, Herbert A., Capt., USAF  
SCHAFER, Thomas L., Capt., USAF  
SCHROEDER, F. F., Capt., USAF  
SHELLEY, William M., Capt., USAF  
SHMERLING, Sanford A., Capt., USAF  
SIDLEY, Nathan T., Capt., USAF  
SIGMAN, Eugene M., Capt., USAF  
SILVER, David, Capt., USAF

SMITH, Robert L., Capt., USAF  
SINDER, Bobby E., Capt., USAF  
SPADY, Charles A., Capt., USAF  
SPENCE, Ravel B., Capt., USAF  
SPINDELL, Edward, Capt., USAF  
SPRITZ, Morton, Capt., USAF  
STALLINGS, Hugh A., Capt., USAF  
STELRONCKY, George J., Capt., USAF  
STENSHAPPE, Leon J., Capt., USAF  
STOLER, Malcolm W., Capt., USAF  
STRICKLAND, C. E., Capt., USAF  
TATE, Darrell T., Capt., USAF  
TAYLOR, Paul W., Jr., Capt., USAF  
TAYLOR, William R., Capt., USAF  
THOMAS, James H., Capt., USAF  
TUCKER, Jerome L., Capt., USAF  
TWEDDY, Franklin V., Capt., USAF  
URBAN, Frank R., Capt., USAF  
VERMEIRE, David A., Capt., USAF  
VOGELPHOL, Elmer B., Capt., USAF  
WALKER, Gilbert H., Capt., USAF  
WELLS, Robert M., Capt., USAF  
WENGER, Jay A., Capt., USAF  
WHITE, Charles M., Jr., Capt., USAF  
WOOD, Ray M., Jr., Capt., USAF  
WRIGHT, Allan R., Capt., USAF

## DENTAL CORPS

ASH, Allen A., Capt., USA  
BRUNBACK, Roscoe L., Capt., USA  
CHANG, George H. M., Capt., USA  
CONLEY, Max, Capt., USA  
COX, George C., Capt., USA  
DRAGODA, Eugene, Capt., USA  
DRANGSHOLT, Thomas, Capt., USA  
ELBERT, William F., Capt., USA  
ELLIS, Alfred D., Capt., USA  
FENWICK, Terrance L., Capt., USA  
FESSLER, James J., Capt., USA

FOLTAN, Stefan M., Capt., USA  
FONTANA, Penny, Capt., USA  
GEORGE, Constant J., Capt., USA  
HANSCH, Parry J., Capt., USA  
KING, Marvin B., Capt., USA  
LAMPERT, Henry, Capt., USA  
MAYBERRY, Don M., Capt., USA  
NEILSON, George E., Capt., USA  
FRILL, Richard D., Capt., USA  
SADOWNY, Donald, Capt., USA  
WREN, Edward C., Capt., USA

## MEDICAL SERVICE CORPS

BALL, John E., Jr., Capt., USAF  
BLACK, James W., Maj., USAF  
BROWN, Irwin G., Maj., USAF  
DAVIS, William J., 1st Lt., USA  
EDGERLEY, Edward, Jr., 1st Lt., USAF  
FLAVIN, Raymond A., Capt., USAF  
GOODMAN, Fred, Maj., USAF  
GOULD, Norman S., 1st Lt., USAF  
GULLERUD, Ernest N., 1st Lt., USAF  
HORTON, John J., 1st Col., USAF

JOHNSON, Kenneth B., Col., USAF  
MCANALLY, Resgan V., Capt., USAF  
PHILLIPS, Edward F., 1st Col., USAF  
PIPPITTE, Robert G., Capt., USAF  
SANGSTER, Maynard A., 1st Col., USAF  
STETZER, Harvey A., 1st Lt., USA  
SMITH, Francis S., 1st Col., USAF  
STERLING, James E., Capt., USAF  
THOMAS, Frederick W., 1st Col., USAF  
WANGCOY, Howard R., Jr., Capt., USAF

## ARMY & AIR FORCE MEDICAL SPECIALIST CORPS

REINEOLD, Carolyn, Capt., USAF

SHULTZ, Nina Freda, Capt., USAF

## NURSE CORPS

BURDETTE, Ethel, Capt., USAF  
CHASZAR, Cuth A., Capt., USAF  
COUGHLIN, Mary B., Capt., USAF  
GLASMEYER, Mildred R., Capt., USAF  
HARRIS, Katie F., 1st Lt., USAF  
JANSON, Mary A., Capt., USAF  
KLECKOVICH, Beatrice E., Capt., USAF  
MACE, Laura I., Capt., USAF

MILES, Ruth M., Capt., USAF  
NEWSON, Clara K., Capt., USAF  
OKEEFE, Frances M., Capt., USAF  
PARTON, Veda G., Capt., USAF  
PROCKY, Mary, Capt., USAF  
REED, Mary J., Capt., USAF  
ROBERTS, Lola B., 1st Lt., USAF  
THOMAS, Cecelia M., Capt., USAF

## VETERINARY CORPS

BECKER, Frederick F., Capt., USAF  
BLANCHARD, Harry F., Capt., USAF  
DAKE, Charles D., Capt., USAF  
FRANZMANN, Albert W., Capt., USAF

GORMAN, Parry A., Col., USAF  
KINDINGER, Richard A., Capt., USAF  
MATTES, John R., Jr., Col., USAF

## Reviews of Recent Books

Christopher's TEXTBOOK OF SURGERY, edited by *Loyal Davis*, M. D. 6th edition. 1,484 pages; 1,359 illustrations on 716 figures. W. B. Saunders Co., Philadelphia, Pa., 1956.

The sixth edition of Christopher's *Textbook of Surgery*, now edited by Loyal Davis, M. D., has little resemblance to the old text. Completely reorganized, the broadly diversified subject of general surgery is handled in a more orderly manner. There are 87 contributors in the present edition compared to 198 in the fifth edition. This gives each contributor a much better opportunity to cover a particular subject. By handling the topics in this manner, a more smoothly written and more interesting book has been produced. Only 32 of the previous group of contributors are included in the present group of collaborators. The illustrations and figures have also been revised, and many new subjects have been introduced. Among these are: history of surgery, endocrinology and metabolism in surgical care, nuclear radiation injuries, and physical medicine and rehabilitation. A short biographic sketch about each contributor also appears, adding an intimate and interesting note to the text. The end result is an excellent new textbook of general surgery.—FERDINAND V. BERLEY, *Capt., MC, USN*

DISEASES OF THE NERVOUS SYSTEM, by Sir *Russell Brain*, Bt., D. M. (Oxon.), P. R. C. P. (London). 5th edition. 996 pages; illustrated. Oxford University Press, New York, N. Y., 1955. Price \$10.50.

This is the fifth edition of a well-known, single-volume text of neurology by one of England's outstanding specialists in this field. As noted in the preface to the first edition in 1933, the author has included appropriate sections on anatomy and physiology as introductions to the various clinical chapters. This departure from the more traditional arrangement, in which anatomy and physiology are treated as separate introductory chapters, fulfills its purpose of aiding the reader to integrate basic science material with clinical data.

The volume is divided into 23 chapters that correspond to the usual categorization of neurologic disorders such as tumors, congenital and degenerative diseases, injuries, infections, syphilis, diseases of cerebral circulation, viral infections, intoxications, and the like. The first chapter serves as an introduction and considers disorders of function in the light of anatomy and physiology. Here is included a rather complete explanation and elaboration of the neurologic examination, with discussions of abnormal findings and their causation from the standpoint of altered function or structure. The last chapter, "Psychological Aspects of Neurology," is an endeavor to state the extent to which behavioral or psychological phenomena can be understood in terms of

neurophysiology. In a sense this chapter serves notice that the brain is the organ of the mind and that the neurologist cannot avoid considering the probabilities of behavioral phenomena that may be associated with structural or altered physiology of the nervous system.

The author draws upon his vast experience to write concisely and state unequivocally his views pertaining to this or that neurologic disorder and its treatment. There is no vacillation or attempt to renege. For this reason this text has served, and should continue to serve, a most useful function for medical students and a reference for practitioners, internists, and other physicians. Neurologists are apt to find the text somewhat limited in scope and lacking in detail that no single volume of neurology could hope to achieve.

—ALBERT J. GLASS, Col., MC, USA

**MEDICAL RESEARCH: A MIDCENTURY SURVEY.** Two volumes. Volume I, *American Medical Research: In Principle and Practice*. Volume II, *Unsolved Clinical Problems: In Biological Perspective*. Published for the American Foundation, New York, N. Y. Chairman: *Curtis Bok*; Member-in-charge: *Esther Everest Lape*; Committee of 26 Consultants. Volume I, 765 pages; Volume II, 740 pages. Little, Brown & Co., Boston, Mass., 1955. Price \$15 for set of two volumes.

This monumental two-volume survey of American medical research has as its stated purpose the clarification of the role of research in biology, chemistry, and physics in relation to the maintenance of high standards of medical education and of medical care for the whole population.

Volume 1 presents the biologic basis of medicine; the contributions of chemistry, physics, and mathematics to biologic and medical research; current conditions affecting research; a comprehensive view of agencies engaged in and supporting research; and an examination of scientific literature and products with the controls in effect.

Volume 2 presents the current concepts of a series of medical problems and the contributions from many investigative areas. The authors have selected 10 such medical problems—metabolism in its basic cellular aspects as well as those of the organism as a whole, cancer, infertility, arteriosclerosis, hypertension, rheumatic diseases, tuberculosis, viral diseases, alcoholism, and schizophrenia.

It must be said that these volumes have achieved in a significant measure the purpose of the survey. This work is a very discerning and penetrating view of the role of the basic sciences in medical research and in medical education. Perhaps more than any other, this survey will establish, for those not in the medical sciences, and possibly for some in the medical field, the fact that sound, advanced medical teaching must be coupled closely with medical research, if not by the same individuals, then by the same departments and institutions.

The particular groups for whom this publication has special value include perhaps first of all those in the field of medical research, for

this survey has ranged deeply into many facets of the support, administration, and the pattern itself of medical research. These volumes should be of value also to those who have a part in the administrative aspects of medical research, and all who have some measure of responsibility for the support of medical research. These volumes will serve the clinician, the specialist, and the professional man outside the medical sciences who desires the general background and present-day pattern of medical research for other reasons, and finally the person of any background who wishes to review one of the most intensely interesting developments of our time.

The style is worthy of some comment. The facts are presented very concisely, with evaluation generally in the form of quotations or extracts from authorities in the particular field. While in the more subjective fields this manner of presentation occasionally results in a rather concentrated diet with many rich and provocative phrases, and reads like a series of quotations from dedicatory addresses, the material in general is well chosen and assembled in a sound manner. In those areas of varied opinion or controversy there appeared to be an honest effort, at least by those contributors familiar to the reviewer, toward a balanced presentation. There are abundant references in the text, with specific listing of sources in an appendix to each volume.

Points of criticism are minor in the face of this outstanding compilation of data on the field of medical research and competent review of the particular clinical problems. Occasional errors are encountered which are not of moment and which, furthermore, would be quickly apparent to anyone familiar with, or moving into, the particular subject.

This reviewer found these volumes both interesting and stimulating, and a valuable sourcebook for several phases of the medical research field.—CARL F. TESSMER, Col., MC, USA

MANAGEMENT OF PAIN IN CANCER, edited by M. J. Schiffrin, Ph. D. Eight contributors. 245 pages; illustrated. The Year Book Publishers, Inc., Chicago, Ill., 1956. Price \$4.50.

This short, concisely written book was originally composed primarily for the benefit of the general practitioner. The mechanisms for pain relief are simply and succinctly expressed, running through the gamut of modalities from systemic analgetics to psychologic support. It is not the purpose or intent of this text to provide the practicing physician with a handbook to which he can turn for exact instruction in the performance of all methods of pain relief in the cancer problem. Many methods identified under nerve blocking, neurosurgical, humoral, chemical, general surgical, and radiation procedures can only be performed by highly expert individuals working in these various mediums. This small volume does give the clinician a bird's eye view of the vast supporting mechanisms which exist for the amelioration of the pain problem in the cancer patient. It will permit him to recommend more intelligently such assistance which might not otherwise have been con-

sidered appropriate or feasible. I believe this volume has a definite place in the library of the clinician who must often give much thought to the alleviation of distress in a problem generally considered hopeless and inevitable.—**DAVID GOLD, Col., USAF (MC)**

**THE INTERPRETATION OF THE UNIPOLAR ELECTROCARDIOGRAM**, by *Gordon B. Myers, M. D.* 164 pages; illustrated. The C. V. Mosby Co., St. Louis, Mo., 1956. Price \$4.75.

This short book impresses the reader as the distillate of the author's extensive experience, thought, and contributions in the field of electrocardiography. The style of the book is superbly concise and organized but if the author has been sparing with words, he has been comprehensive in the subject material presented. In the preface the author states that the book is an outgrowth of manuals prepared for graduate courses previously given by the author and therefore hews strictly to the format common to such manuals. For this reason there is no bibliography, and illustrations are diagrammatic and not profuse. However, the clarity of the author's presentation more than compensates for the lack of illustrations. The discussion of the arrhythmias is particularly well organized, clear, concise, and comprehensive. This book will be a valuable and relatively inexpensive addition to the library of anyone interested in the subject and an extremely useful guide for the student or busy practitioner who may wish to refresh his familiarity with the subject and has not the time that more formal texts require. In this unpretentious book Dr. Myers has again made a useful contribution to the literature.—**THOMAS W. INNON, Lt. Col., MC, USA**

**SURGICAL DIAGNOSIS**, by *Philip Tborak, M. D.*, with drawings by *Carl T. Linden*. 320 pages; illustrated. J. B. Lippincott Co., Philadelphia, Pa., 1956. Price \$12.

This textbook includes only those conditions which more commonly fall into the realm of general surgery. Obviously in the space of one volume an attempt could be made only to deal with those aspects of surgery which would seem to be the most important. The book reflects the effort to give more information about those matters with which every general practitioner should be familiar rather than to attempt to cover the entire field of surgery.

While no emphasis was made to minimize laboratory aids, the main effort in this text has been made toward the recognition and diagnostic application of signs and symptoms of lesions that may be seen, felt, or heard. It is written in a clear, concise, and easily readable style. The author has resorted to many line drawings and illustrations which give clarification to the text. The illustrations are good and all are original. There are no references given at the end of each chapter.

This book should be found to be very helpful, not only to general practitioners but also to general surgeons who desire to obtain in a concise manner information about the diagnosis of most common surgical conditions.—**JAMES D. KING, Capt., MC, USN**

ADVANCES IN PEDIATRICS, Volume VIII, edited by S. Z. Levine. 273 pages; illustrated. The Year Book Publishers, Inc., Chicago, Ill., 1956. Price \$8.

This publication is issued yearly and consists of seven distinct reviews, each relating to a separate topic of current interest to those who deal with children. It does not differ in make-up from the preceding seven volumes. The treatment of each subject is exhaustive and serves not only as a means of bringing the reader up to date but also as an excellent source of reference material. The titles of the reviews in the current volume and the authors are as follows: (1) The Etiology of Infantile Diarrhea, by Horace L. Hodes; (2) Isosexual Precocity in Boys Including a Case of a Gonadotropin-Producing Teratoma, by Samuel Z. Levine and associates; (3) Sarcoidosis in Childhood, by John P. McGovern and Doris H. Merritt; (4) Offspring of Diabetic and Prediabetic Mothers, by Herbert C. Miller; (5) Subdural Lesions in Childhood, with Special Reference to Infectious Processes, by Margaret H. D. Smith; (6) Prevention of Accidents in Childhood, by George H. Wheatley; and (7) Mental Deficiency, by Herman Yanner.

This book, as does its predecessors, provides condensed information about some common and some less familiar subjects. All those who deal with children will find it of value in one way or another.

—SEYMOUR E. WHELOCK, Capt., MC, USAR

THE NAVAL OFFICER'S MANUAL, by Rear Admiral Harley Cope, USN (Ret.). A Ready Reference of Helpful Information and Counsel for All Officers of the United States Navy and the Marine Corps. 3d edition. 608 pages; illustrated. The Military Service Publishing Co., Harrisburg, Pa., May 1955. Price \$4.

There are several good books which serve as sources of useful information for Navy and Marine Corps officers. In this reviewer's opinion, the new edition of Admiral Cope's recent manual is the best of these.

It has the twin advantages of profuse illustrations and current data. The rapidly changing organization of the armed services, the many new regulations, benefits, and recommendations make books of this type out of date relatively quickly. In this book, the information is surprisingly current. Almost every conceivable topic dealing with personal and interpersonal affairs is considered. These range from uniforms to retirement pay, and from descriptions of aircraft carriers to housing in the Azores.

There is also an exceptionally complete appendix of naval and military terms, as well as a detailed index.

This clear and informative manual will be especially appreciated by newly commissioned officers, but all naval readers will benefit from its storehouse of information on personal and professional matters.

—S. O. WAIFE, Lt. Comdr., MC, USNR

**APPLIED ORTHODONTICS**, by *James David McCoy*, M. S., D. D. S., in collaboration with *Earl Emanuel Shepard*, D. D. S. 7th edition. 336 pages; 212 illustrations and 9 plates. Lea & Febiger, Philadelphia, Pa., 1956. Price \$7.50.

This is written primarily as an introductory text in the field of orthodontics. The first eight chapters concern the scope of orthodontics. Growth, development, and anomalies and their etiology are presented in an interesting, concise manner. Pretreatment records, including the technics of manipulation of impression material and the making of gnathostatic casts, are adequately described. Essential requirements of orthodontic appliances and the detailed application of the authors' therapy are presented with a number of case reports from actual practice.

The illustrations and plates are excellent and serve to enhance the orderly presentation of the subject material.

It is recommended, not only for the student of orthodontics, but for the practicing orthodontist, pedodontist, and general practitioner of dentistry.—*GEORGE H. PARROT, Jr., Lt. Col., DC, USA*

**PRACTICAL ORTHODONTICS**. Original Text by the Late *Martin Dewey*, Fifth, Sixth, Seventh, and Eighth Editions revised by *George M. Anderson*, D. D. S. 8th edition. 702 pages; illustrated. The C. V. Mosby Co., St. Louis, Mo., 1955. Price \$17.50.

In the preface to this eighth edition of *Practical Orthodontics*, the editors state the absolute essentiality of continuing education in the professions. In the short period between the seventh and eighth editions, there have been important additions to diagnostic and treatment procedures which every practitioner or student of orthodontics must include in his service to his patients.

The 22 chapters of this edition are unusually well organized and indexed. There are adequate photographs, x-ray film reproductions, diagrams, and drawings to clarify the subject matter presented. The term "normal occlusion" is analyzed and defined. It has been adjusted to reality wherein the term is recognized as covering a range of variability rather than a rigidly fixed standard of perfection. Inheritance, as it affects facial form, receives considerable attention, for evidence continues to mount that genetic factors control and direct many of the orthodontic problems. Anthropometric considerations and cephalometric appraisal have been included in this edition because of the importance each of these fields has assumed in orthodontic practice. An entirely new subject of osteoporosis or craniotabes, as it affects the skull, face, and jaws and influences malocclusion, is included. Improvement in the removable appliance field and the addition of more material relative to extra-oral anchorage outlines the possibilities in this phase of clinical effort. All subjects derive stature from a record of the past, and the history of orthodontics has been rewritten to provide a more comprehensive review than have previous editions.

—*GEORGE S. MOORE, Col., USAF (DC)*

THE GIVE AND TAKE IN HOSPITALS, A Study of Human Organization in Hospitals, by *Temple Burling*, M. D., *Edith M. Lentz*, Ph. D., and *Robert N. Wilson*, Ph. D. 355 pages. G. P. Putnam's Sons, New York, N. Y., 1956. Price \$4.75.

In this book is presented a very readable report of human relations problems in hospitals, written to truly interest and profitably instruct hospital personnel at all levels. It should prove to be an invaluable source of practical guidance, destined to become an essential library edition for hospitals of all types and for institutions concerned with training personnel for hospital service.

The report represents experiences and observations accumulated during a five-year period of research in community hospitals operated under the auspices of voluntary organizations for nonprofit purposes, where general medical and surgical care is offered and most patients are short-term guests.

The hospitals selected for study and analysis of interpersonal relationships ranged in capacity from 50 to 850 beds, one located in a metropolitan community, the others in smaller and homogenous towns and in rural or semirural areas.

Approximately 1,000 persons were interviewed, many of whom had had a wide experience in hospitals elsewhere. They came from all levels of the hospital system and a great many of their answers to pertinent questions by the interviewers and voluntary statements of significance are quoted throughout the book. The investigators in many instances assumed employee roles, actually performing non-professional routine work.

The most important chapter of the book, in my opinion, is titled "The Admissions Office." Here are described at length and in considerable detail the many elements of human relations essential to sound management and impartial amicable relationships with community doctors and the local population. Every practicing physician and surgeon in this country should be afforded the opportunity of reviewing this one chapter of the book if none other. It is my fervent hope that each reviewer apply the object lesson contained therein to his own situation with regard to exercising prerogatives of prestige and popularity in seeking admissions ahead of patients of other doctors with lesser professional experience and recognition by admissions office personnel.

Other interesting group relationships pointed out by the committee were those existing between nursing staff and dietitians with perhaps a tinge of rivalry, and comparison of motivation factors between housekeepers and laundry workers.

The study was initiated by the American Hospital Association with a view to achieving more effective co-operation between employers and employees and more general recognition of their mutual rights, obligations, and duties.—CHARLES L. CRAWFORD, *Comdr., MSC, USN*



PRINCIPLES OF RENAL PHYSIOLOGY, by Homer W. Smith, Sc. D., M. D. (Hon.). 237 pages; illustrated. Oxford University Press, New York, N. Y., 1956. Price \$5.

This is an excellent, brief, general survey of renal physiology in which voluminous references and data have been largely omitted to permit a clear presentation of principles. The subject matter includes anatomy, an historical note on theories of renal function, concepts of renal clearances and information derived therefrom, excretion of specific substances, mineral and water metabolism, acid-base equilibria, and control of the renal circulation. The book is more than a "distillate" from the author's well-known comprehensive work, *The Kidney: Structure and Function in Health and Disease*—it brings us up-to-date on important interim research, such as electron microscopy of the nephron, the tubular cell as an ion exchanger, "plasma-skimming" in the renal circulation, et cetera.

The material is well organized, smoothly written, and frequently spiced with bits of philosophy and wit. Despite the "almost lecture-style," the author manages, by skillful use of footnotes and appendixes, to pack much factual information into this small volume. Thus, many facts of comparative physiology are tersely stated: " $\text{Na}^+$  predominates in the red cells of the dog, cat, ox, goat, etc., but  $\text{K}^+$  predominates in man, monkey, guinea pig, rat, rabbit, pig, horse, and some sheep."

The appendixes include an interesting explanation and derivation of "The Henderson-Hasselbalch Approximation Equation, 'A Most Useful Monument to Human Laziness'." There are nomograms for estimation of surface area in dog and man, and a most useful "do-it-yourself" section giving explicit instructions for the performance of renal clearances, including details of chemical methods for inulin, PAH (para-amino-hypuric acid), creatinine, and chloride. Appendix 6 consists of answers to problems presented throughout the text, inviting the student to learn by calculating (and interpreting) specific clearances,  $\text{Tm}$ 's, et cetera, from given "raw data."

The short bibliography was selected to guide the student to articles of historical significance, reviews, and recent articles (since 1950) presenting notable advances.

The format and illustrations are good, and the colored plate showing the anatomy of the kidney is lucid and beautiful.

Although this book lacks a preface the reader soon appreciates that it superbly fulfills the goal implicit in its dedication: "To all students for whom the ever-widening horizons and increasing details of medicine make the art of healing more difficult and yet more certain."

Any physician or scientist interested in renal physiology should own this book.—MARION E. McDOWELL, Lt. Col., MC, USA

A SHORT HISTORY OF MEDICINE, by *Erwin H. Ackerknecht*, M. D. 258 pages. The Ronald Press Co., New York, N. Y., 1955. Price \$4.50.

Dr. Ackerknecht is the Professor of History of Medicine and the director of a very active department at the University of Wisconsin Medical School. He is best known by his biography of Rudolf Virchow. In his new book he has tried to delineate the entire course of medicine from paleopathology to the 20th century, compressing the subject within 20 chapters of approximately 10 pages each. Naturally, he can touch only on some of the highlights. Dr. Ackerknecht's style is fluent and his exposition elegant. He uses easy, nontechnical English. The book is meant to reach a large audience regardless of specialized training. It will be read with profit by anyone interested in acquiring some idea of the status of medicine throughout the ages. In this regard the book fills a void which has existed in the American literature.

—HELMUTH SPRINZ, Lt. Col., MC, USA

AMERICAN MEN OF SCIENCE, A Biographical Directory, edited by *Jaques Cattell*. 9th edition. Volume II, "Biological Sciences." 1,276 pages. The Science Press, Lancaster, Pa., and R. R. Bowker Co., New York, N. Y., 1955. Price \$20.

The 9th edition of the well-known American Men of Science is so much larger than its predecessors that it was decided to publish the brief biographies of about 95,000 names in three volumes.

Volume 2, covering the Biological Sciences, includes about 25,000 biographies and an additional 5,000 references to persons listed in Volume 1 (Physical Sciences), which means that a total of 30,000 biological scientists are recorded.

This unique series, which began in 1906, has served a most useful function in making available the essential biographical information about a great number of our leading scientists.

—BENNETT F. AVERY, Capt., MC, USN

PEDIATRIC X-RAY DIAGNOSIS, A Textbook for Students and Practitioners of Pediatrics, Surgery and Radiology, by *John Caffey*, M. D. 3d edition. 1,059 pages; 2,264 illustrations on 1,267 figures. The Year Book Publishers, Inc., Chicago, Ill., 1956. Price \$28.

The first edition of this book was published in 1945. It filled a long-standing need in the roentgenologic literature, as no book on pediatric diagnosis had been printed in English since the appearance in 1910 of the pioneer publication by Dr. Thomas Morgan Rotch of Harvard University. Caffey's outstanding book immediately became the standard reference work in its field and to date it has had no competitor.

This handsome new third edition became necessary because of the rapid increase in knowledge in pediatric roentgenology. It has been extensively revised, with 197 additional pages and 228 additional illustrations. Additional space has been devoted to the presentation of normal radiologic findings. There is a new section on congenital

dysplasia and dislocation of the hip. The sections on congenital heart disease, megacolon, coxa plana, and slipping of the femoral epiphysis have been rewritten, and there is a chapter on intracranial pneumography. There are some 70 other revisions or introductions of new subjects throughout every section of the book. The work is encyclopedic except for the omission of material on such specialized technics as angiocardiology, cardiac catheterization, planigraphy, cerebral angiography, and myelography, all of which are treated in separate monographs and which the author rightly considers better omitted from a text on general diagnosis. Following discussion of each individual entity, and almost on every page, are listed the references pertinent to that entity. This division of the text into short sections, each devoted to but a single item, adds greatly to its convenience for reference use.

The text is clearly written and handsomely printed on heavy gloss paper. Illustrations are uniformly excellent. All radiographs are reproduced in the original negative and are of high quality. Many line drawings accompany reproductions of radiographs to point out the finer details of the latter. The binding is attractive but seems too light for a massive 6½-pound reference book that will be constantly in use, particularly in busy teaching departments. A more serviceable binding would be desirable.

This magnificent volume stands unrivaled in its field and reflects great credit on the author and the publishers. It is to be regretted that its increase in size is reflected in a large increase in price over the previous editions, which undoubtedly will somewhat limit its general availability. —CARR E. BENTAL, Capt., MC, USN

THE NEUROSES IN CLINICAL PRACTICE, by Henry P. Laughlin, M. D.  
802 pages, W. B. Saunders Co., Philadelphia, Pa., 1956, Price \$12.50.

This comprehensive and well-thought-out book is a worthwhile addition to the list of psychiatric textbooks. It is one of the few that concerns itself only with the neuroses, and while it appears to be partly directed toward the medical student and nonpsychiatrist, it offers much that is useful to the psychiatrist and teacher. Although the author's orientation appears to be psychoanalytic, he carefully avoids the use of the less well-defined psychiatric and psychoanalytic terms and concepts. Indeed, he is most careful to define his descriptive terms, both in the body of the text and in a large and complete glossary at the end. He develops all of his concepts methodically and with great care, so that at times the more experienced reader feels a certain amount of repetitiveness.

The author uses a large number of very brief case histories to illustrate his descriptive material. These are effectively presented, and only the part of the history relevant to the point or points discussed are utilized. They serve to complement the text in a most interesting manner. The format of the book includes carefully labeled chapters, sections, and subsections, with a 22-page table of contents referring

to each of these. The long table of contents, plus a 53-page index of subjects and a separate index of personal names, all make for very easy reference use of the book. The text includes description, dynamics, and treatment of each of the neuroses, as well as sections or chapters on such general areas as anxiety, the mental mechanisms, primary and secondary gains in emotional illness, over-concern with health, and the neuroses following trauma. The latter contains an interesting section on "brain washing."

This book is recommended for medical students, but perhaps more for the clinician who sees a large number of neurotic patients in general practice. The latter will find this an easily read, interesting, and practical reference book. Psychiatrists, particularly those who teach, will find the author's descriptions and illustrative anecdotes to be thought-provoking and helpful. The author has succeeded in using his apparent wealth of clinical experience to present his subject in an interesting, practical, and useful textbook.—WILLIAM HAUSMAN, Lt. Col., MC, USA

ELECTROCARDIOGRAPHY, Fundamentals and Clinical Application, by Louis Wolff, M. D. 2d edition. 342 pages; illustrated. W. B. Saunders Co., Philadelphia, Pa., 1956. Price \$7.

The second edition of this book has been prepared with the purpose of incorporating certain aspects of spatial vectorcardiography. The importance of spatial orientation of cardiac vectors in evaluating electrocardiographic variations is emphasized throughout. The author presents in an easily readable, readily comprehensible, and well-illustrated manner the principles of applied electrophysiology of the heart. He illustrates clinical electrocardiographic findings with reproductions of many tracings of both normal and abnormal patterns. A new section on the arrhythmias and disturbances of cardiac mechanism has been added.

There is considerable space allotted to electrocardiographic patterns in the standard leads. More frequent inclusion of findings in right precordial leads ( $V_{3R}$  and  $V_{4R}$ ), left chest leads ( $V_7$  and  $V_8$ ), and high precordial leads would have simplified and clarified some interpretations.

In discussing the electrocardiographic diagnosis of myocardial infarction, the author states: ". . . acute S-T segment displacement and characteristic progressive T wave changes constitute a more reliable sign of infarction than do the QRS deflections." Perhaps more emphasis should have been placed on the differentiation between the normal and the abnormal Q wave, particularly in relation to the associated type of P wave.

Generally speaking, the book is free from typographical errors, and the reproductions of drawings and electrocardiograms are clear. It is recommended as a basic introduction to electrocardiography and vectorcardiography for the student and the practicing physician who is interested in the fundamentals in this field. The section on the arrhythmias

is excellent. The section on clinical electrocardiography is more suited for the trained internist or cardiologist, who should enjoy this book as a valuable addition to his medical library.

—ROBERT N. CLASS, Maj., USAF (MC)

THE CELLULAR BASIS OF WOUND REPAIR, by *Martin Allgöwer*, M. D. 125 pages; illustrated. Charles C Thomas, Publisher, Springfield, Ill., 1956. Price \$6.50.

For many years there has been a divergence of opinion concerning the role of nucleated blood cells in the formation of granulation tissue. Many of our presently accepted theories of wound healing are based on Marchand's thesis that the precursors of connective tissue came from small vasculat adventitial cells and not from blood cells. Maximow, on the other hand, postulated that nucleated blood cells were the precursors of fibroblasts.

This monograph is the result of several years of research carried out by a very capable investigator in America and in Switzerland. It is an attempt to establish the facts postulated by Maximow that repairs regarding regeneration of connective tissue find principal support from an adequate local supply of mononuclear blood elements. Experiments investigating the occurrence of mitosis in fresh wounds and granulation tissue formation following total body irradiation indicated that the part played by certain blood elements in the formation of new connective tissue has been greatly underestimated. Extensive reduction in the number of these cells resulted in a decrease of granulation tissue of from 50 to 70 per cent. The experiments presented give no definite indication as to which of the blood cells are capable of producing connective tissue. It seems improbable that monocytes are the only element involved.

This book probably is not of great interest to the clinician but should be of considerable value to anyone interested in the study of wound repair. Several techniques for studying wound repair at the cellular level are carefully described. The book is beautifully illustrated with several excellent photomicrographs.—CURTIS P. ARTZ, Lt. Col., MC, USA

CLINICAL LABORATORY METHODS AND DIAGNOSIS, Volumes One and Two, by *R. B. H. Gradwohl*, M. D., D. Sc. 5th edition. Volume I, Chapters I to VI, pages 1-1220, 29 color plates, 295 figures. Volume II, Chapters VII to XVII, pages 1221-2452, 23 color plates, 470 figures. The C. V. Mosby Co., St. Louis, Mo., 1956. Price \$38.50 for two volumes.

The first edition of this voluminous work was published in 1935. The fifth edition is in two volumes of 2,460 pages, having been contracted from three volumes and 3,100 pages which constituted the fourth edition in 1948. The book is well bound, the paper is good, and the printing easily readable. There are 17 chapters, each dealing in general with a recognized division of clinical pathology as well as one each devoted to basal metabolism, electrocardiography, toxicological technique, and tissue cutting and staining.

Throughout the book the generally accepted method of primary choice is given first for most technical procedures. This is frequently followed by one or more alternate methods, some of which are obsolete and could well have been omitted. An interpretation of findings generally follow procedures in most instances.

The chapter dealing with hematology is the largest, consisting of 477 pages—a fair sized book in itself. The hematologic technics are presented in considerable detail. Critical evaluation of this chapter reveals several paradoxes as exemplified on page 523 where the term "granulocytic" leukemia is recorded as the one of choice, yet throughout the text the author persists in using the term "myelocytic." The organization of this chapter lacks delineation into well-defined topics. For instance, the section on the normal composition of blood which includes the abnormal forms of hemoglobin lacks any information on the various electrophoretic types of hemoglobin. The many colored blood cell plates are of fair quality. The section on heredity of blood groups is covered in considerable detail and should be a convenient reference in studies concerning questionable paternity.

While some of the more common examinations of presumptive virus material, such as those for rabies, are sufficiently presented, better instructions for collecting, preserving, and shipping such material would be desirable. The treatment of laboratory procedures for the study of viruses is inadequate, and most of it could well be eliminated.

In general, the book gives in more or less detail almost all current and recent laboratory procedures with which the laboratory officer might have to deal, as well as many which are now obsolete and should not be perpetuated. Although many methods are described conveniently, descriptions of others are widely scattered as, for example, with reference to the detection of *Treponema pallidum* in fresh material, the location of partial descriptions ranges from Volume 1, page 11, to Volume 2, pages 1582 and 1644, while serologic tests are considered in a different chapter altogether.

An attempt is made to present the clinical aspects of many diseases, particularly those mentioned in interpretation of results of laboratory tests. It is apparent in a number of areas that the clinical aspects of those diseases presented are paraphrases of the summaries of articles for which references are given. Some contain omissions of phrases which render the statements concerning the disease meaningless; one example obvious to this reviewer is in the section dealing with epidemic hemorrhagic fever, page 835, where the relationship of shock and the occurrence of necrosis in the anterior lobe of the pituitary is discussed.

Although the organization for presentation of the vast amount of material may leave something to be desired, the indexing appears to be adequate so that from the standpoint of reference the book can readily be used. The index appears in each volume.

From the standpoint of the needs of a medical laboratory officer this text is sufficiently complete so far as content is concerned, although sometimes the subject matter is poorly arranged, necessitating considerable cross-referencing. These two large volumes would serve better as a work of reference rather than a handy daily guide.

—WILLIAM M. SILLIPHANT, *Capt., MC, USN*

**HISTORY OF THE SECOND WORLD WAR, United Kingdom Medical Series.** Editor-in-Chief, Sir Arthur S. MacNalty, K. C. B., M. D., F. R. C. P., F. R. C. S. **THE ROYAL AIR FORCE MEDICAL SERVICES**, edited by Squadron Leader S. C. Rexford-Welch, M. A., M. R. C. S., L. R. C. P., R. A. F. Volume II, *Commands*. 695 pages; 54 plates and 51 maps, diagrams and figures. Published by Her Majesty's Stationery Office, London, E. C. 1, 1955. To be purchased from York House, Kingsway, London, W. C. 2. Price 75s. net (\$13.50).

The story of how the British military medical profession met the challenge of air warfare is one of the brightest chapters of World War II. This story encompasses not only the problems of aviation medicine but the age-old problems of field medicine, such as sanitation, housing, and hospitalization, as well.

Volume II, *Commands*, continues the comprehensive and official history of how the Royal Air Force Medical Services supported the Air Force combat mission. The previous volume treated the area of administration, and the third is scheduled to cover the campaigns. This unit of three volumes, produced under the able editorship of Squadron Leader Rexford-Welch, is one part of the comprehensive series, "History of the Second World War, United Kingdom Medical Series." Sir Arthur S. MacNalty, Editor-in-Chief, has written a foreword.

The 12 chapters treat the Bombet, Fighter, Coastal, Transport, Balloon, Army co-operation, Maintenance Flying Training, and Technical Commands; and also the closely allied formations, the Second Tactical Air Force, No. 60 Group, and the Royal Air Force Regiment. Chapter 1, which discusses the Bombet Command, is possibly the most significant in the book because it deals in detail with the many mutual problems that harassed all the commands; thus it sets the pattern for the book and makes it possible to avoid repetition in subsequent chapters. In this chapter the problems of aviation medicine are treated at length. The section which deals with such areas as oxygen, night vision, frostbite, and flying stress is alone worth the price of the book. The hitherto taboo problem of "moral fibre" is discussed from the medical viewpoint.

While one wishes the present history had been documented similar to those in the previously published clinical volumes (edited by Sir Zachary Cope under MacNalty's general editorship), it is nevertheless authoritative and readable. The illustrations and maps are well chosen, and there are appendixes inserted at the end of several chapters. It is a "must" for military medical libraries, particularly those concerned with aviation medicine.—MAE M. LINK, *Ph. D.*

**PATHOLOGIC PHYSIOLOGY, Mechanisms of Disease**, edited by William A. Sodeman, M. D., F. A. C. P. 2d edition. 963 pages; illustrated. W. B. Saunders Co., Philadelphia, Pa., 1956. Price \$13.

It is a tribute to American medicine that the first edition of Dr. Sodeman's *Pathologic Physiology* had such a popular reception that a second edition was required. This book correlates basic physiology and pathology with clinical medicine, and those who employ references such as this in their practices must *pari passu* become more astute and capable physicians.

In compiling this book, the editor has enlisted an "all-American" cast of 29 outstanding clinicians and teachers. Each is a recognized authority in his specialty, and all have published extensively in medical journals or texts.

All systems are covered thoroughly in a manner designed to clarify and teach the reader the physiology of body systems and the variations caused by morbid processes. Despite the number of authors the book is well integrated. Illustrations and tables are well placed and add measurably to the instructional value of the reading context. There is an excellent bibliography appended to each chapter.

Besides an up-to-date revision of the chapters presented in the first edition, Dr. Sodeman has added three new chapters on subjects not covered in the first edition.

This book should be of particular value to general practitioners, internists, and surgeons, and will serve as an excellent reference for those medical officers stationed aboard ship and on overseas assignments. This book can be used as a self-teaching source for postgraduate study by those unable to take time off for didactic training.

—JULIAN LOVE, Capt., MC, USN

**THE YEAR BOOK OF THE EYE, EAR, NOSE AND THROAT (1955-1956 Year Book Series)**. The Eye, edited by Derrick Vail, M. D., D. Oph. (Oxon.). The Ear, Nose and Throat, edited by John R. Lindsay, M. D. 471 pages; illustrated. The Year Book Publishers, Inc., Chicago, Ill., 1956. Price \$6.50.

This yearbook is divided into two sections; the first, edited by Dr. Derrick Vail, consists of 235 pages devoted to ophthalmology. The second section, edited by Dr. John R. Lindsay, consists of 94 pages devoted to otology and 118 pages devoted to rhinolaryngology and allergy. The abstracts in this book are from both foreign and domestic literature and for the most part are well chosen. The editors are to be commended for their excellent and painstaking work. Editorial comments after many of the controversial articles are both interesting and instructive. The subject index is quite complete for a book of this kind and adds much to the value of the book. The *Year Book* is recommended to all specialists in ophthalmology and otolaryngology who wish a quick review of the literature during the past year.

—SHIRLEY A. FUHRING, Capt., MC, USN



CHEST X-RAY DIAGNOSIS, by Max Ritvo, M. D. 2d edition, revised. 640 pages; 633 illustrations on 426 engravings and 1 color plate. Lea & Febiger, Philadelphia, Pa., 1956. Price \$16.

The appearance of this second edition of *Chest X-ray Diagnosis* a scant four years after publication of the first reflects the rapid evolution of the newer diagnostic criteria and techniques of examination applicable to the chest.

This edition follows the format of the first. The purposes are to describe and illustrate the roentgen findings in normal and diseased states of the lungs, the heart, and their coverings and to evaluate their potentialities and limitations in diagnosis. The author has had an extensive experience and is thoroughly qualified for this undertaking. He has carefully correlated roentgen findings with clinical and pathologic aspects. The latter are described briefly but succinctly and concisely. The emphasis is on the roentgenologic viewpoint.

The book catalogs a very comprehensive list of normal and abnormal conditions. The work is divided into eleven sections corresponding to the anatomic divisions of the chest. The text is profusely illustrated. Except for a few small reproductions of conventional chest roentgenograms, which show a significant loss of detail, the illustrations are of excellent quality.

Among the new subjects not covered in the first edition are amyloidosis, tuberous sclerosis, hemorrhagic fever, eosinophilic granuloma, and hyaline disease of the lungs; traumatic torsion of the lung; broncholithiasis; primary tumors of the diaphragm; hibernoma; parathyroid tumors of the mediastinum; and several congenital cardiac lesions. The chapter on congenital diseases of the heart and great vessels is greatly expanded over that in the earlier edition and is especially well written from the standpoint of the roentgenologist.

The author refers favorably to the use of test doses of radiation therapy in the differential diagnosis of mediastinal tumors (page 323) and illustrates one example with a presumed diagnosis on the basis of such a test (page 332). Although not absolutely discredited, the therapeutic irradiation test is not in good favor today, because radiosensitivity is a poor indicator of histologic structure, and accurate microscopic diagnosis can be obtained with relative ease through exploratory thoracotomy without significant mortality or morbidity.

The place of the chest roentgenogram in the practice of medicine is well established, as is the continuing need for suitable reference books concerning its interpretation. Those physicians and students concerned with the examination of the chest will find *Chest X-ray Diagnosis* a rich source of timely information in logically organized form.

—HARRY L. BERMAN, Col., MC, USA

## New Books Received

Books received by the U. S. Armed Forces Medical Journal are acknowledged in this department. Those of greatest interest will be reviewed in a later issue.

- OF WATER, SALT AND LIFE, an atlas of 36 pages illustrating 31 color plates, prepared and distributed by Lakeside Laboratories, Inc., Milwaukee, Wis., 1956.
- THE ACCIDENT SYNDROME, *The Genesis of Accidental Injury, A Clinical Approach*, by Morris S. Schulzinger, M. A., M. D. 234 pages; illustrated. Charles C Thomas, Publisher, Springfield, Ill., 1956. Price \$6.50.
- FLUID BALANCE HANDBOOK FOR PRACTITIONERS, by William D. Snively, Jr., M. D., and Michael J. Sweeney, M. D. 326 pages; illustrated. Charles C Thomas, Publisher, Springfield, Ill., 1956. Price \$6.75.
- TEXTBOOK OF UROLOGY, by Victor F. Marshall, M. D., F. A. C. S. 268 pages; illustrated. Paul B. Hoeber, Inc., Medical Book Dept. of Harper & Bros., New York, N. Y., 1956. Price \$5.50.
- NEUROLOGICAL AND NEUROSURGICAL NURSING, by C. G. deGutiérrez-Mahoney, M. D., and Esta Carini, R. N., M. A. 2d edition. 565 pages; illustrated. The C. V. Mosby Co., St. Louis, Mo., 1956. Price \$6.25.
- CHANGING CONCEPTS OF PSYCHOANALYTIC MEDICINE, Proceedings of the Decennial Celebration of the Columbia University Psychoanalytic Clinic, March 19 and 20, 1955, edited by Sandor Rado, M. D., D. Pol. Sc., and George E. Daniels, M. D. 248 pages. Grune & Stratton, Inc., New York, N. Y., 1956. Price \$6.75.
- PLASTIC REPAIR OF GENITO-URINARY DEFECTS, by George Bankoff, M. D., D. Ch., F. R. C. S. Ed., F. R. F. P. S. 355 pages; illustrated. Philosophical Library, Inc., New York, N. Y., 1956. Price \$17.50.
- PSYCHOANALYSIS OF BEHAVIOR, *Collected Papers*, by Sandor Rado, M. D., D. P. Sc. 387 pages. Grune & Stratton, Inc., New York, N. Y., 1956. Price \$7.75.
- SELECTED PAPERS ON PSYCHO-ANALYSIS, Volume I: On the Early Development of Mind, by Edward Glover, M. D. 483 pages. International Universities Press, Inc., New York, N. Y., 1956. Price \$7.50.
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# UNITED STATES ARMED FORCES MEDICAL JOURNAL

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*Editor*

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*Associate Editors*

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UNITED STATES  
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## Monthly Message

The paragraph printed below is the first part of one of the paragraphs in President Jefferson's First Inaugural Address, in which he advises that we keep clear of entangling alliances. As you will recall, his first administration was really the great period of his presidency, for it was during these years that the Louisiana Purchase was made and the Lewis and Clark Expedition organized and carried through to a highly successful conclusion.

*About to enter, fellow-citizens, on the exercise of duties which comprehend everything dear and valuable to you, it is proper you should understand what I deem the essential principles of our Government, and consequently those which ought to shape its Administration. I will compress them within the narrowest compass they will bear, stating the general principle, but not all its limitations. Equal and exact justice to all men, of whatever state or persuasion, religious or political; peace, commerce, and honest friendship with all nations, entangling alliances with none; the support of the State governments in all their rights, as the most competent administrations for our domestic concerns and the surest bulwarks against antirepublican tendencies; the preservation of the General Government in its whole constitutional vigor, as the sheet anchor of our peace at home and safety abroad. . . .*

*Frank B. Berry*

FRANK B. BERRY, M. D.  
Assistant Secretary of Defense  
(Health and Medical)

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## Foreword

The *United States Armed Forces Medical Journal* is the medium for disseminating information of administrative and professional interest to all medical personnel of the Department of Defense. The Assistant Secretary of Defense (Health and Medical) and the Surgeons General of the several services invite all medical officers, dental officers, Medical Service Corps officers, Nurse Corps officers, and officers of the Veterinary Corps of the Armed Forces, and the medical consultants of the Army, Navy, and Air Force to submit manuscripts for publication in this journal.

FRANK B. BERRY, M. D.,  
*Assistant Secretary of Defense (Health and Medical).*

MAJOR GENERAL SILAS B. HAYS,  
*Surgeon General, United States Army.*

REAR ADMIRAL BARTHOLOMEW W. HOGAN,  
*Surgeon General, United States Navy.*

MAJOR GENERAL DAN C. OGLE,  
*Surgeon General, United States Air Force.*

# UNITED STATES ARMED FORCES MEDICAL JOURNAL

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## DIPHENHYDRAMINE THERAPY OF EPIDEMIC HEMORRHAGIC FEVER

*In the Early Febrile Phase*

JOE L. STOCKARD, *Captain, MC, USA*

EDWARD H. HALE, *Captain, MC, USA*

HOKE V. BULLARD, *First Lieutenant, MC, USA*

**E**PIDEMIC hemorrhagic fever (EHF) is characterized by physiologic and pathologic changes that appear to involve primarily the vascular system.<sup>1-3</sup> The flushed appearance of the skin and the conjunctival injection commonly observed in the first three days (early febrile phase of disease) and the hemorrhages, proteinuria, elevated hematocrit values, and peripheral vascular shock seen after the third day (late febrile and shock phases of disease), all suggest a generalized alteration in the capillary vessels.<sup>4-6</sup> Greisman,<sup>7</sup> in direct observation of the nailfold capillary bed, noted dilatation and loss of vasomotion during the late febrile phase in about 80 per cent of the patients. Because such physiologic changes resemble those induced by histaminelike substances, an earlier group of investigators<sup>8</sup> undertook the treatment of EHF patients with diphenhydramine (Benadryl Hydrochloride ®). Although these results were equivocal, it should be noted that treatment was initiated some days after onset of illness, when the patients had already developed a severe proteinuria.

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From the Field Unit of the Commission on Hemorrhagic Fever of the Armed Forces Epidemiological Board, at the Hemorrhagic Fever Center and the 45th Evacuation Hospital, Korea; and from the Walter Reed Army Institute of Research, Washington 12, D. C. Dr. Stockard is now at the University of Maryland School of Medicine, Baltimore, Md.

The authors gratefully acknowledge the support of the Commission and the help of their colleagues in the Center, the Hospital, and the Institute, as well as the backing of the Office of the Surgeon, Eighth U. S. Army, and of the Surgeon, Armed Forces of the Far East. Special thanks are due to Dr. Joseph E. Smadel for his assistance in planning the study, and to Lt. Col. D. Crozier, MC, Lt. Col. E. Ricketts, MC, Lt. Col. D. White, MC, Capt. C. Sourham, MC, Lt. Col. H. L. Ley, Jr., MC, Maj. L. P. Frick, MSC, and Lt. P. Moore, AMC, for aiding us in the study or in preparing this report.



Interest in a humoral factor capable of causing capillary damage revived when plasma from patients acutely ill with EHF was found to cause dilatation of terminal arterioles of the rabbit bulbar conjunctiva.<sup>9</sup> Furthermore, diphenhydramine again came into the picture when this drug was shown to block or reverse the vasodilatation induced in the rabbit's eye by patient's plasma.<sup>9</sup> The idea was entertained that diphenhydramine might arrest or impede the progress of EHF if administered before the vascular physiologic changes reached the point where severe plasma leakage occurred. The present study was undertaken to test this hypothesis in patients whose treatment was begun within 36 hours after onset of EHF.

### METHODS

During earlier outbreaks of EHF, patients seldom had been admitted to the Hemorrhagic Fever Center (HFC) in Korea before the third day of their illness. Therefore, in this study, which covered the period from May to July 1954, one of us was stationed at a division clearing company in a sector that was a known EHF endemic area, to permit early examination of suspected cases and to institute therapy in selected patients within the shortest possible time after onset of illness. All patients reporting to this advanced installation with complaints of headache, backache, and malaise were chosen for special study if they also presented the following history and findings: exposure in a known EHF endemic area 1 to 6 weeks before the onset of symptoms; oral temperature of 100°F or higher; duration of illness of 36 hours or less; and absence of a positive malaria smear, tonsillar exudate, or roentgenologic evidence of pneumonia. All potential EHF patients whose symptoms were of short duration were thus included in the study, while patients whose illness might be attributable at this time to other causes were excluded.

Diphenhydramine has a sedative effect in addition to an antihistamine action, and since rest and sedation are considered important in the treatment of EHF,<sup>4</sup> it seemed necessary to administer a sedative drug to a control group of patients. Phenobarbital was chosen for this purpose. Sufficient diphenhydramine or phenobarbital to provide a full course of drug for one patient was packed in a bottle that bore no markings other than a code number.\* Moreover, the phenobarbital was dispensed in capsules having the same appearance as those containing diphenhydramine. Selection of patients who were to receive one or the other drug was made arbitrarily: When the sum of the last 3 digits of the patient's army serial number was even, he received 200 mg of diphenhydramine orally every 6 hours for 4 doses, followed

\*Beadryl and phenobarbital used in the study were supplied by Parke, Davis and Company.

by 100 mg every 4 hours for 24 doses, *i. e.*, 3.2 grams over a 5-day period. When the sum was odd, the patient received 20 mg of phenobarbital orally every 6 hours for 4 doses, followed by 10 mg every 4 hours for 24 doses, *i. e.*, 0.32 gram over a 5-day period. When medication was vomited within an hour, the same dose was readministered orally. The coded bottle containing the complete course of drug was marked with the patient's name; this stayed with him until used or until the man was dropped from the study. Only the investigator who selected the patients in the forward area and started them on therapy knew the code.

Patients initially diagnosed as probably having EHF were promptly evacuated to the HFC. Others were observed for a few days in a special ward at the division clearing company; if the diagnosis of EHF could not be excluded, these patients were also evacuated to the HFC. All patients were transported by helicopter in order to minimize trauma.<sup>1</sup> A copy of the recorded clinical and laboratory observations, medication schedule, and the remaining capsules of drug in the patient's own bottle accompanied each man. Daily examination and care at both installations included observation of clinical symptoms and signs, recording of fluid intake and output, and determination of leukocyte count, hematocrit by the copper sulfate method, and specific gravity of urine. Daily qualitative and quantitative urine protein determinations were made at division clearing and the HFC, respectively. Blood urea nitrogen values were determined daily at the HFC only. General care included diet as tolerated, and when indicated because of anorexia, vomiting, or oliguria, 5 or 10 per cent dextrose in distilled water administered intravenously. Demerol (brand of meperidine hydrochloride) was given when pain was severe. Patients were permitted to begin ambulation on the third day after proteinuria ceased or, in the absence of proteinuria, on the second afebrile day. No patient in this study received either aspirin or hormone therapy.

Criteria for the final diagnosis of "epidemic hemorrhagic-fever confirmed" were as follows: (1) exposure in a known endemic area within 1 to 6 weeks of the onset of symptoms; (2) oral temperature over 100°F persisting for 4 or more days; (3) proteinuria of 0.5 gram per liter on 2 or more consecutive days; (4) hyposthenuria, specific gravity less than 1.024, during the second week of illness by 12-hour Fishberg concentration test or serial 24-hour urine specimens; and (5) one or more of the following: petechiae, azotemia with blood urea nitrogen over 25 mg per 100 ml, oliguria with 24-hour urine output of less than 500 ml per day, diuresis with 24-hour urine output of at least 3,000 ml per day for 2 consecutive days, leukocytosis with white blood cell count exceeding 10,000 per  $\mu$ l, or hemoconcentration with hematocrit over 53 ml per 100 ml. Patients whose findings did not fulfill these criteria and who did not have a recognizable nosologic

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entity were discharged after two or more days without fever, as "fever of undetermined origin" (FUO).

The treated and placebo groups of patients were compared with regard to the severity of illness when therapy began, incidence of confirmed EINF, severity and duration of symptoms and signs, and the duration and degree of abnormalities of the renal and hematopoietic systems as revealed by laboratory tests. In statistical analysis, the "t" test was used for evaluating differences between time after onset when therapy was begun, initial temperatures, and initial leukocyte counts. The presence or absence of albuminuria in the treated group was compared with the findings in the placebo group by the chi-square test with correction for small numbers. This test was also used to test for differences in incidence of confirmed EINF between the two groups. In interpreting the findings, differences were not considered significant unless the probability that they could have arisen by chance was 0.05 or less.

### RESULTS

Evaluation of therapeutic procedures in EINF is complicated by the lack of specific procedures for establishing the diagnosis in a given patient. One is justified in making a diagnosis of confirmed EINF only in fatal cases which show pathognomonic lesions, or in patients who survive after displaying the classical clinical and laboratory findings of the disease. Thus, mild cases of EINF may remain unrecognized and receive a final diagnosis of fever of undetermined origin (FUO). Nevertheless, even under these circumstances an effective therapeutic regimen employed early in the course of disease might be recognized in a controlled study by a significantly low incidence of confirmed EINF in the treated as compared with the control group. Furthermore, partial effectiveness of such a regimen might be recognized if disease in the treated group were less severe than in the control group.

Of 93 patients who were included in the present study as EINF suspects, 47 received diphenhydramine and 46 the placebo (phenobarbital). The planned treatment schedule was completed in 68 per cent of the treated group and 70 per cent of the controls. Therapy was discontinued in all but 2 of the remaining patients because of early complete recovery; diphenhydramine was discontinued in those 2 patients because of possible drug toxicity. After eliminating from consideration patients whose temperature returned to normal within 4 days, as well as those with a diagnosable disease other than EINF, 34 patients (37 per cent) remained in the category of possible or confirmed EINF. Of these, 15 received the test drug and 19 the placebo. Careful analysis revealed that patients receiving the two regimens were comparable with respect to the pretreatment status of fever, leukocyte count, and proteinuria (table 1).

TABLE 1. Pretreatment status of patients

Diagnostic groups	Therapy	Number of patients	Therapy started hours after onset		Admission temperature		Admission WBC ( $\times 1,000$ )		Proteinuria Number of patients				
			Mean	Range	Mean	Range	Mean	Range	0	T*	1+	2+	3+ & 4+
All patients	Diphenhydramine	47	20.9	5-36	102.1	100.0-104.8	9.0	4.2-22.0	35	4	7	1	0
	Phenobarbital	46	22.2	5-36	101.9	100.0-104.2	8.56	4.25-20.1	36	3	6	1	0
Patients with possible or confirmed EHF	Diphenhydramine	15	22.9	7-36	101.7	100.0-103.0	8.63	5.15-15.0	10	2	3	0	0
	Phenobarbital	19	24.1	7-36	102.1	100.0-104.2	8.25	4.4-13.6	13	2	4	0	0
Patients with confirmed EHF	Diphenhydramine	5	26.4	19-32	101.4	100.0-102.2	6.52	5.0-8.75	4	1	0	0	0
	Phenobarbital	6	23.9	18-31	102.4	100.0-103.8	7.14	5.0-11.2	4	0	2	0	0

\*Trace



A final diagnosis of confirmed EHF was made on 11 patients. Five of these had been treated with diphenhydramine and 6 with phenobarbital. When very mild cases of confirmed EHF, *i. e.*, those with minimal proteinuria and blood urea nitrogen not exceeding 25 mg per 100 ml were excluded, there remained three cases in the treated and five in the control group. Statistical analysis demonstrated that rates of confirmation were not significantly different in the two treatment groups. Thus, it may be concluded that diphenhydramine did not affect the disease sufficiently to reduce the incidence of confirmed EHF.

No impressive differences were noted in the clinical course of the disease in the confirmed EHF cases treated by the two regimens. No fatalities occurred in either group, and the duration and severity of signs and symptoms were essentially the same in both. Petechiae were present for 16 patient-days in those given the test drug and for 18 patient-days in those who took the placebo. Subconjunctival bleeding occurred in one patient from each group and minimal epistaxis in one who received the antihistaminic. Slight fever persisted longer in some of the patients given the sedative, but the mean duration of fever was almost identical in the two groups. One patient in each group had mild hypotension which responded promptly when the foot of the bed was elevated.<sup>1</sup> Statistical analysis revealed no significant difference in the severity of hemocentration attained by patients in the two groups.

Although proteinuria was less severe in the test series, the difference was largely attributable to one patient in the placebo group, and statistical analysis indicated that the difference could readily be due to chance. Likewise, maximum levels of azotemia did not differ significantly (table 2). Therefore it may be concluded that even when administered early in the course of disease diphenhydramine did not influence the renal abnormalities that occur in EHF.

Data from all 93 patients in this study were analyzed for evidence of pharmacologic and toxic effects of diphenhydramine (table 3). Vomiting occurred with equal frequency and severity in the two groups, and was attributable to the disease rather than to the drugs. There was no appreciable difference in pain, as judged by the physician's clinical estimate of suffering or by the total dosage of Demerol administered by ward nurses. Duration of fever (over 99°F) was the same in both groups. Frequency of leukopenia (less than 5,000 white blood cells per  $\mu$ l) and neutropenia (below 50 per cent) was equal in both groups, but persistence for more than 4 days occurred only in 2 patients, both of whom received diphenhydramine. No bleeding tendency

was attributable to the drugs. In the test group, drowsiness was frequent, and disorientation with or without agitation was seen in 4 patients. These central nervous system changes disappeared on cessation of therapy.

TABLE 2. Renal function studies in confirmed EHF patients

Test	Diphenhydramine (5 patients)		Phenobarbital (6 patients)	
	Mean	Range	Mean	Range
Total grams protein excreted during illness	11.8	4.9-21.3	35.8	8.4-76.7
Maximum grams protein excreted per day	5.3	1.9-11.0	14.3	3.9-26.4
Day of disease maximum proteinuria	7.8	6-11	5.8	3-7
Latest day of proteinuria	10.8	7-14	12.0	8-17
Mean protein excretion per day during proteinuria phase	2.15	0.8-2.4	4.31	2.0-6.4
Duration of proteinuria (days)	6.8	3-9	7.5	4-12
Maximum blood urea nitrogen (mg/100 ml)	61.4	21-132	56.7	14-88
Patient-days of oliguria (less than 500 ml/24 hr)	6		1	
Patient-days of diuresis (over 3,000 ml/24 hr)	17		20	

## DISCUSSION

The basic mechanism responsible for the alteration of vascular function in hemorrhagic fever remains unexplained. Recent investigations by Greisman and associates<sup>10</sup> revealed that the vasodilator factor found in the blood of patients during the first few days of EHF also appeared in the plasma of normal human beings after a 48-hour starvation period, and both produced the same vascular effect in an experimental animal. The starvation state may provide a likely explanation for the vasodilator effect of plasma from hemorrhagic fever patients. At any rate the reversal of the plasma-induced dilatation in the rabbit's eye by diphenhydramine was found dependent upon the vasoconstrictor rather than antihistaminic properties of the drug.<sup>10</sup> These animal experiments have neither eliminated local histamine release as the cause of vascular dysfunction in hemorrhagic fever nor ex-

TABLE 3. *Incidence of various findings in 47 patients treated with diphenhydramine and 46 patients treated with phenobarbital*

Findings	Therapy	
	Diphenhydramine	Phenobarbital
<i>Vomiting</i>		
Number of patients	7	5
Number of episodes	26	26
Total volume (liters)	2.5	3.2
<i>Pain</i>		
Patients receiving Demerol	10	9
Total Demerol administered (grams)	4.25	4.4
Subjective pain, average score	8.8	9.4
<i>Fever</i>		
Average number days over 99°F orally	4.7	4.9
Range of duration, days	1-14	2-13
<i>Leukopenia</i>		
Patients with less than 5,000 white blood cells	14	16
Patients with 3,000 to 3,500 white blood cells	2	2
Patients with leukopenia persisting more than 4 days	2	0
Patients with neutropenia less than 50 per cent	3	3
<i>Bleeding tendency</i>		
Patients with subconjunctival hemorrhage	2	2
Patients with mild epistaxis	3	1
<i>Central nervous system changes</i>		
Patients with drowsiness	12	4
Patients with disorientation	2	0
Patients with agitation	2	0

plained the mechanism by which the increased capillary permeability occurs. However, diphenhydramine even when given early in the course of EHF did not alter significantly the progression of the disease, thus suggesting that a factor other than histamine is involved in the important vascular changes which characterize this infection.

### CONCLUSIONS

Certain clinical and experimental observations suggested that the abnormal vascular phenomena which characterize epidemic hemorrhagic fever might be controlled by antihistamines if given early in the disease. A careful clinical investigation, in which 47 EHF suspects were treated with diphenhydramine within 36 hours after onset of illness and 46 similar patients received phenobarbital, failed to indicate any benefit from the antihista-

mine therapy. The severity of the disease in the test and placebo groups was comparable, and the proportion of suspected cases that were eventually confirmed as EHF was not significantly different in patients on the two regimens.

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## WHERE'S THE APOSTROPHE?

"What happened to the apostrophe in the name, *St. Elizabeths*, has long been a mystery and will perhaps continue to be one. I did considerable research on how the name of our hospital became so ungrammatical, but the best I am able to report is that the apostrophe was lost sometime between the Civil War and the time the name was officially changed by the Congress 50 years later."

—WINFRED OVERHOLSER, M. D.  
in *Hospitals*, p. 68, Aug. 1955

# THE USE OF CORTISONE IN THE TREATMENT OF MUMPS ORCHITIS

EDWIN S. STENBERG, Jr., *Lieutenant Colonel, MC, USA*  
WILBUR C. BERRY, *Colonel, MC, USA*

**M**UMPS is an acute communicable disease which has been recognized as a clinical entity for many centuries. Caused by a virus and known to be one of our most contagious of diseases, it classically involves the parotid glands, less frequently the submaxillary and other salivary glands. As complicating features, the virus may involve and cause inflammatory changes in the central nervous system, breast, pancreas, ovaries, and testes. Involvement of the last named, producing an epididymo-orchitis, is estimated to occur in from approximately 20 to 30 per cent of male patients who have the disease.

Because of the undesirable result of a varying amount of testicular atrophy in about 50 per cent of these cases, a thorough search has been made in the past for methods to prevent or ameliorate the acute inflammatory involvement of the testes. Many simple measures, such as bed rest, application of ice packs, scrotal support, and maintenance of adequate fluid intake, are generally considered to be of value. The use of estrogens, in particular diethylstilbestrol, for the prevention and treatment of mumps orchitis has been tried for many years, and, as there has been no convincing evidence that any striking benefit has resulted, their use has, in general, been discarded.

Cortisone acetate was given orally in a series of approximately 50 cases at this hospital in order to prevent orchitis, and the results were disappointing.<sup>1</sup> Although no well-studied series has appeared in the literature to date, many physicians have believed that the use of corticotropin and cortisone acetate in the treatment of mumps orchitis was of value. Friedewald<sup>2</sup> stated that, in his experience, these hormones have been effective in causing a rapid decrease in the pain and swelling of acute orchitis. Kinsell and Jahn<sup>3</sup> reported that intensive corticoid therapy appears to be consistently associated with rapid and complete disappearance of all inflammation in the gonads, and that if it is instituted early, probably no residual damage will result.

## MATERIALS AND METHODS

In an effort to evaluate this prevailing opinion, a study was made at this hospital that included all patients with mumps accompanied by orchitis who were admitted here between 1 July 1955 and 10 January 1956. There were 21 such patients in this study. Their ages ranged from 14 to 56 years with an average age of 29.5 years. All patients with orchitis were treated with the accepted conventional measures, including absolute bed rest, analgesics as necessary, a Bellevue bridge for scrotal support, and ice bags as necessary. In addition to these measures, 14 of our 21 patients were given cortisone acetate orally, while the remaining 7 received only symptomatic therapy.

The first 4 patients in our treated series were given very short courses of cortisone acetate and, after an initial evaluation of their apparent lack of response, a more standard regimen was employed consisting of an initial dose of 300 mg the first day, 200 mg the second, and 150 mg the third and subsequent days. The drug was continued as long as seemed clinically necessary, and then the dosage was reduced in daily decrements of 25 mg. When the total daily dosage had been reduced to 25 mg, it was discontinued. The maximum amount used was 1.825 grams over an 11-day period.

No complications or untoward effects were noted in the treated group, although two patients (coincidentally, we felt) developed moderately severe herpes simplex of the face and labial areas during cortisone therapy.

## RESULTS WITHOUT CORTISONE

In the untreated group, three of the seven patients had mild to moderate orchitis, and all three responded completely within three days to standard methods of therapy. Of the remaining four who had moderately severe to severe orchitis, two became asymptomatic and afebrile with return of the testes to normal size by the seventh day of the disease. The other two patients are discussed in the following case reports.

## Case Reports

*Case 1.* A 24-year-old white man was admitted to this hospital on 18 August 1955 with a one-day history of salivary gland swelling and fever. On admission, he had tremendous bilateral parotid and submaxillary swelling and a temperature of 100°F. On the following day, an exudative pharyngitis was noted and a culture was taken which grew out beta hemolytic streptococci. On 19 August he was given 991 mg (1,200,000 units) of benzathine penicillin G intramuscularly. He became afebrile on the fourth hospital day and remained so until the seventh hospital day when he developed a temperature of 104°F without other clinical change. It was felt that a recrudescence of his pharyn-

gitis had occurred, and aqueous penicillin in the dose of 360 mg (600,000 units) every six hours was begun. On the following day, slight bilateral testicular swelling was noted and the patient's temperature rose to 104°F. The day after that his temperature rose only to 101°F, and penicillin was discontinued. The next morning he was afebrile and remained so thereafter. His testicular swelling increased gradually over the first three days and then subsided over the subsequent three days. At no time was tenderness noted. He was discharged to duty on 2 September without residual symptoms or positive physical findings.

*Comment.* It was felt that this patient most likely had developed moderate orchitis during the course of mumps, which was complicated by a beta hemolytic streptococcal pharyngitis which caused the high febrile response. In other ways, the orchitis responded well to symptomatic therapy and lasted six days.

*Case 2.* A 26-year-old white man was admitted to this hospital on 3 January 1956. On the morning of admission, the patient first noted right parotid swelling and tenderness and a very slightly swollen, but exquisitely tender, right testicle. His temperature on admission was 102°F where it remained for the first three hospital days, during which time no essential change was noted in the orchitis. On 6 January the patient began to have daily elevations of temperature to 104° and 105°F accompanied by severe headache and nuchal rigidity, and a diagnosis of mumps encephalitis was made. During this time the testicular involvement began to recede; on 10 January, however, the right testis became more swollen and the left one became minimally involved. By 13 January the temperature returned to normal, central nervous system symptoms and signs disappeared, and the orchitis was improving. By 17 January physical examination was normal, and the patient was without complaints. He was returned to duty on 20 January.

*Comment.* Although this patient's orchitis lasted for 14 days, it was secondary to his major problem of encephalitis and did not produce any significant symptoms.

### RESULTS WITH CORTISONE

In the treated group, four patients received cortisone acetate therapy for only three days and were believed to have been inadequately treated. One of these patients had a mild case that responded completely in three days. One had moderately severe orchitis, was started on cortisone on the fourth day of the testicular swelling, and three days later was clinically well. The other two patients were improving on the fourth day of discontinuance on the third day developed a temperature of 104°F, respectively. Both thereafter became afebrile and their symptomatic therapy over a four-day period.

a moderately successful response as evidenced by symptomatic improvement without complete relief, and by a somewhat more protracted course with evidence of testicular inflammation for 7, 9, 12, and 12 days, respectively, while on cortisone acetate therapy. The remaining 2 patients showed an excellent response when adequate dosages were employed and are reported below.

### Case Reports

*Case 3.* A 56-year-old white Army chaplain noted the onset of parotid gland swelling and tenderness on 1 September 1955. On 4 September he observed swelling of the right testicle and was admitted to this hospital on 5 September with increased testicular swelling and marked malaise. At that time his temperature was 99.6°F; there was moderate bilateral parotid and submaxillary swelling, and the right testicle was twice normal size and exquisitely tender. He was placed on cortisone acetate therapy, receiving 300 mg on 5 September and 200 mg on 6 September. His symptoms rapidly regressed and by the morning of 7 September he was asymptomatic and afebrile. The 0600- and 1200-hour doses were omitted. That afternoon his temperature rose to 102°F, and there was a marked increase in size and tenderness of the right testicle. By 1800 hours cortisone acetate was restarted in a dosage of 25 mg every 6 hours, and within the subsequent 24 hours the patient again became afebrile and asymptomatic. By 13 September the testicle had returned to normal size, and the dosage of cortisone acetate was tapered thereafter until on 16 September it was discontinued and the patient returned to duty.

*Comment.* This was believed to be our most dramatic case, since the patient initially had shown an excellent clinical response, only to have a marked relapse when cortisone acetate was omitted for 12 hours, and since reinstitution of therapy was again followed by a complete symptomatic and febrile remission.

*Case 4.* A 36-year-old white male Air Force major was admitted to this hospital on 27 August 1955 with a two-day history of parotid gland swelling and right testicular swelling of one day's duration. His temperature was 99.4°F on admission. Bilateral submaxillary gland swelling and tenderness were noted, and the right testicle was moderately enlarged and nontender. He was placed on cortisone acetate therapy, receiving 300 mg on 28 August, 200 mg on 29 August, and 100 mg on 30 and 31 August. His initial symptomatic response was excellent and, although his temperature had not risen above 100°F, he was completely afebrile by 30 August. On 31 August, however, his temperature rose to 102°F and on 1 September to 103°F with increased testicular pain and swelling. On 1 September, therefore, cortisone acetate was increased to 200 mg per day for the next three days, with an immediate and excellent symptomatic response. He became afebrile on 3 September and remained so thereafter. The right testicle gradually decreased in size, and was normal when the patient was discharged to duty on 8 September.



*Comment.* This patient showed an excellent initial response to cortisone acetate, followed by an exacerbation of symptoms when the dosage was reduced below the optimum level and by a dramatic response when an increased amount of the drug was again given.

### DISCUSSION

No definite conclusions can be reached from this relatively small series of patients. However, we have arrived at what we think is a reasonable approach to the treatment of mumps orchitis. It appears there is little to be gained from the routine use of cortisone acetate in treatment of the minimally involved testis. Control patients and treated patients revealed no difference in their response to therapy, either subjectively or objectively, and all were clinically well within 3 to 4 days. It does seem justified, however, to treat patients who have moderately severe or severe orchitis with this hormone if certain factors are kept in mind. As in many other conditions where cortisone acetate is of benefit, the principal good derived is due to the antiphlogistic action of the hormone as the drug exerts no direct action on the causative organism. Therefore, adequate dosage is important and, in particular, a sufficiently prolonged course is necessary to cover the ordinary period of the inflammatory process in the testis if a clinical relapse is to be avoided. There is no evidence to show that the natural course of orchitis is shortened by the use of cortisone acetate. With these limitations and factors in mind, moderate to excellent symptomatic relief for the patient is to be expected.

### SUMMARY

A study to evaluate the efficacy of cortisone acetate in the treatment of mumps orchitis was made. Of 21 patients seen at this hospital between July 1955 and January 1956, 14 received cortisone acetate therapy in addition to the standard measures received by the control group, i. e., bed rest, analgesics, scrotal support, and ice bags as necessary. Although no statistical evaluation was made, it was our clinical impression that patients with mild to moderate orchitis did well with either form of therapy. In those with moderately severe or severe mumps orchitis, an excellent symptomatic response resulted when adequate dosage of cortisone acetate was maintained for a sufficient period of time.

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# SOMNAMBULISM

## Electroencephalographic Studies and Related Findings

CHESTER M. PIERCE, *Lieutenant, MC, USNR*

HARRY H. LIPCON, *Captain, MC, USN*

**B**ECAUSE of the observation that 26.6 per cent of 60 enuretic naval recruits were sleepwalkers and that 25 per cent of these 60 men had abnormal brain waves,<sup>1</sup> it was decided to obtain electroencephalograms and relevant genito-urinary, sleepwalking, and enuretic histories on a group of naval recruits who presented a primary problem of somnambulism. The observations suggest that in many cases of sleepwalking, bed-wetting, and epilepsy, the pathophysiologic process may be similar. Theoretically, an emotional stimulus is capable of activating a genetically determined central nervous system aberrancy, which results in the episodic behavior.

### MATERIAL

The experimental group consisted of 34 naval recruits who came to the attention of the medical department during an eight-month period. All of these men had been observed, while in training, to walk in their sleep. Confirmation that this habit existed prior to enlistment was obtained through a social service agency report from each man's home town.

For control, 60 nonsomnambulistic Electronics School students were studied. The controls represent the superior enlisted man and the sleepwalkers typify the man deemed unsuitable for naval service. Accordingly, the control group was not a true random sample but was used because of military expediency. The electroencephalographic results should not be as distorted by this sampling error as would sociocultural and psychologic factors.

### METHOD

In addition to an electroencephalogram, all subjects were given a thorough physical and neurologic examination. To ensure a more exact evaluation of the brain waves, an inquiry into each man's circumstances at birth, past history of sickness and injuries, periods of unconsciousness, and family history of convulsive disorders was made. The relevant related history pro-

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From U. S. Naval Hospital, Great Lakes, Ill.

cured on each subject included a review of the genito-urinary system and past and family history of both somnambulism and enuresis. The major findings revealed by this inquiry are summarized in table 1.

TABLE 1. *Encephalographic and medical findings in 34 somnambulists and 60 control subjects*

Findings	Somnambulists		Controls	
	Number	Per cent	Number	Per cent
Abnormal electroencephalograms	7	20.6	1	1.7
Family history of sleepwalking	19	55.9	0	0.0
Past history of sleepwalking	34	100.0	2	3.3
Nocturnal enuresis	16	47.1	0	0.0
Past history of enuresis	21	61.8	14	23.3
Family history of enuresis	13	38.2	10	16.7
Epilepsy	3	8.8	0	0.0

Electroencephalographic tracings of all 60 controls and of 30 subjects from the experimental group were made on an *Offner* type ink-writing oscillograph with the technic of 12 lead monopolar and bipolar recordings, bilaterally, from the frontal, temporal, parietal, and occipital areas; and tracings of the remaining four subjects from the experimental group were made on a *Grass* machine, utilizing 16 leads from the same areas. All the recordings were made within a period of three hours after eating.

## RESULTS

Encephalographic tracings of five of the sleepwalkers were interpreted as abnormal and two others were considered to be borderline. These seven (20.6 per cent) other than normal brain waves were characterized by poorly regulated and poorly developed alpha rhythm of 8 to 10 per second with occasional slowing of activity. Hyperventilation tended to accentuate the slow activity and cause some increase in amplitude. One (1.7 per cent) of the controls showed a borderline encephalogram. This man was enuretic until age 15, and he had immediate family members who were enuretic. His record revealed 10 per second alpha rhythm in the anterior and posterior portions of the head, with occasional slow activity (5 to 6 per second) of slightly increased amplitude.

A significant physical finding occurred in a somnambulist who had been rachitic in his first year and who had an ocular paresis of the left eye with resultant diplopia. He complained of lifelong nocturia and had a borderline normal brain wave. His younger sister was somnambulistie.

One somnambulist, age 19, had blood pressure readings of 164/96 mm Hg and, at another time, 172/92 mm Hg. His brain

wave was normal. Immediately prior to his first sleepwalking episode, another somnambulist whose electroencephalogram was normal suffered a fractured skull and while hospitalized was discovered to have Bright's disease. Still another sleepwalker with a normal electroencephalogram described classical bouts of sleep paralysis after awakening. There was no history of cataplexy or narcolepsy in this man.

No person in this study was a twin or triplet. One control had been delivered at birth by cesarean section. His electroencephalogram was normal. A sleepwalker who told of cord strangulation at birth, apparently resulting in severe asphyxia, had a normal brain wave.

One sleepwalker who received a medical discharge for epilepsy alleged difficulty at birth but was unable to furnish details. His electroencephalogram was grossly abnormal and he was observed while under investigation to have grand mal seizures. Two other men in the experimental group had been diagnosed and treated in civilian life as epileptics. One had a borderline electroencephalogram, and the other had a normal electroencephalogram. Both men described recurrent attacks which seemed to be grand mal seizures. Thus there were three epileptics among the sleepwalkers and none in the control group. Two of the known epileptics had immediate family members who walked in their sleep. Two epileptics also were enuretics. Four sleepwalkers (11.8 per cent), all with normal brain waves, complained that they frequently fell out of their beds while asleep.

On genito-urinary system review, 57 complaints were elicited from the somnambulists (table 2). Of these, all but two complaints were made by men with normal brain waves. One man complaining of burning had a borderline electroencephalogram, one complaining of pyuria had an abnormal electroencephalogram. The four complaints in the control group were made by men with normal brain waves.

Table 3 summarizes a statistical treatment of the electroencephalographic relationship.

#### DISCUSSION

The finding of abnormal brain waves in more sleepwalkers than nonsleepwalkers causes us to focus attention on epilepsy and the phenomenon of sleep. Aristotle, in the third century, B. C., recorded the clinical impression that, "in many cases epilepsy begins in sleep, and there are men who are seized with it when asleep but not when awake." It was toward the turn of the present century that Sir William Gowers,<sup>2</sup> in a monumental study of 1,658 epileptics, noted that 22 per cent had attacks only or almost only during sleep, usually occurring in the waking process. A refined study of 2,524 fits occurring in 66 epileptics was report

TABLE 2. *Type and frequency of genito-urinary complaints in 34 somnambulists and 60 control subjects*

Complaint	Times occurring in	
	Somnambulist group	Control group
Dysuria	5	0
Difficulty initiating micturition	3	1
Difficulty ceasing micturition	4	0
Nocturia	9	0
Pyuria	3	0
Hematuria	2	0
Costovertebral angle tenderness	1	0
Frequency	9	1
Urgency	10	1
Burning	2	1
Albuminuria	1	0
Renal lithiasis	1	0
Total	57	4

TABLE 3. *Significance of findings in somnambulist and control groups*

Findings	Observed frequency		$\chi^2$	p**	Interpretation***
	Sleepwalkers	Controls			
Abnormal EEG's	7	1	7.67	>0.01	+++
Family history of sleepwalking	19	0	38.11	>0.01	+++
Genito-urinary complaints	18	4	23.16	>0.01	+++
History of enuresis	21	10	17.6	>0.01	+++
Abnormal EEG's and history of enuresis	5	0	6.7	>0.01	+++
Abnormal EEG's and family history of sleepwalking	3	0	.03	<0.50	+
Abnormal EEG's, family history of sleepwalking, and genito-urinary complaints	3	0	.03	<0.50	+
Abnormal EEG's and genito-urinary complaints	3	0	.03	<0.50	+

\*Chi-square.

+ Not significant

\*\*Probability.

+++ Highly significant

\*\*\*Frequency of occurrence under 10 depicts a trend without establishing statistical significance.

in 1929 by Langdon-Down and Brain.<sup>3</sup> They found that 24.2 per cent had attacks chiefly, if not exclusively, at night. Utilizing a similar technic in America, Patry<sup>4</sup> studied 1,013 fits and found that 19.3 per cent occurred between 2000 and 0600. Further confirmation of Gowers' work was made in an extensive study by Hopkins.<sup>5</sup> By 1936 Magnussen<sup>6</sup> was able to demonstrate that nocturnal seizures seemed most likely to occur at the greatest depth of sleep. Nearly a decade and a half later, Caveness, Parsonage, and Edmond<sup>7</sup> considered that depth of sleep or change in depth of sleep might be crucial in the precipitation of convulsions during sleep.

While cogitating this question it is of interest that Doust and Schneider,<sup>8</sup> using the Millikan oximeter, found that deeper sleep levels paralleled lower blood oxygen saturation percentages. The period of greatest anoxemia, when "life was at its lowest ebb," was from 0400 to 0500. According to Langdon-Down and Brain, this is the precise time at which the highest incidence of nocturnal seizures occur. From all this one might conclude that in the epileptic seizures which occur in relation to sleep, a factor of brain oxygen supply must be reckoned. Inasmuch as the electroencephalogram is a probable indirect index to cerebral metabolism, the abnormal brain tracings in somnambulists may reflect oxygenation inadequacy which, when impaired further during sleep, results in a "seizure" of sleepwalking. That epilepsy is associated with sleep disorders is well documented in the medical literature.<sup>9-14</sup>

Clinically, epilepsy is estimated conservatively as occurring in 1 of every 200 people.<sup>15</sup> In this series the discovery of 3 epileptics among 34 sleepwalkers, plus the unusual history in 4 other men of frequently falling out of bed while asleep, suggests that the sleepwalker is more likely to be epileptic than would a member of the general population. When it is further considered that more sleepwalkers than controls have abnormal brain waves, a relationship is implied between sleepwalking and epilepsy.

Enuresis is another immaturity habit which usually is related to sleep and which may be related to epilepsy. In the nineteenth century, Trousseau<sup>16</sup> lectured on the clinical and heredofamilial relationships between enuresis and epilepsy. Later, Freud<sup>17</sup> cautioned that nocturnal enuresis might be part of an epileptic attack. Turton and Spear<sup>18</sup> reviewed the literature concerning electroencephalograms and enuresis. Their own findings of abnormal brain waves in 51 per cent of 100 severely enuretic children confirmed the belief of other workers from many parts of the world that enuretics are far more likely to have abnormal brain waves.

Studies of service personnel have shown that sleepwalking is often associated with enuresis.<sup>19,20</sup> The study of somnambulists shows that as a group they are similar to enuretics in that they too tend to have abnormal brain waves, a marked propensity toward personal and family histories of enuresis, and chronic, multiple genito-urinary complaints.<sup>1</sup> In addition, the sleepwalker often has a family history of sleepwalking.

The issue of cultural and psychologic influences in sleepwalking will be discussed in a subsequent article.<sup>21</sup> For present purposes, suffice it to state that many of the psychologic theories of the causes of sleepwalking and enuresis have been exemplified in our undertaking. The sleepwalkers have many unresolved oedipal problems and intense sibling conflicts. The development of an actual episode of sleepwalking is commonly related to emotional problems in which the man seems to have a need to run away from the bed (as a place of temptation) or to walk to a place of protection.

We note also that many sleepwalkers commit the act in an effort to reach the toilet in order to urinate. The same mechanism operated in the situation of a half-dozen enuretics, who were indubitably sleepwalking when discovered in their naval barracks by competent observers.

Rottersman<sup>22</sup> inspected the histories of 100 sleepwalking soldiers in World War II and found that 52 per cent of these men completely stopped sleepwalking before age 18. Our experience also has been that many servicemen can list remote past histories of symptomatic immaturity habits. The men in this study, however, are unique in that these habits persisted well into adolescence. It is in this group of men that we believe that a factor of organicity is partially culpable as the causative agent.

To substantiate this impression there are the strong familial incidence of immaturity habits and the possibility of hereditary cortical metabolic disturbance as demonstrated by abnormal electroencephalograms. Also, for many years it has been known in both the clinic and laboratory that central nervous system lesions may cause multiple deviations in the function of the urinary system.<sup>23,24</sup> Thus, many genito-urinary complaints that often appear to be "organic" may be secondary to a central nervous system defect which is manifested by an abnormal electroencephalogram. The proclivity to sleep disorders of various sorts in enuretics and sleepwalkers lends more weight to the hypothesis that a genetically determined anatomic impairment resulting in a biophysical aberration may explain some cases of symptomatic immaturity.

We conclude that sleepwalking and enuresis may suitably augment the system referred to by Langdon-Down and Brain when

they wrote: "Little is known at the present concerning the biochemistry of normal sleep, but further knowledge of both general and cerebral metabolism in the sleeping state may help to explain the striking but obscure relationship between sleep and epilepsy."

### SUMMARY

Due to their military importance the symptomatic immaturity habits were studied for possible organic and psychologic causative factors. The ultimate goal is to effect means to salvage manpower and to improve treatment methods. This article deals with the electroencephalographic findings in sleepwalkers.

Our study of 34 sleepwalkers and 60 nonsomnambulistic Electronics School students reveals that the sleepwalkers have more abnormal brain waves (20.6 per cent to 1.7 per cent); more sleepwalkers have relatives who are sleepwalkers (55.9 per cent to 0 per cent); sleepwalkers frequently have a history, usually concurrent, of enuresis (61.8 per cent to 23.3 per cent); and they have more genito-urinary complaints (57 complaints of 34 sleepwalkers as compared with 4 complaints of 60 control subjects).

It is postulated that in the adolescent male somnambulist organic factors may provide a neuropathic basis for the observed behavior.

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### WHAT IS RESEARCH

"Research is not done only in the laboratory. It may be conducted at the bedside, in the operating room, and in the field of public health and epidemiology. It is not the place that counts. It is the perspective. It is the original mind asking a question and designing an experiment to find the answer. It should not be pebble picking—it should be the building of magnificent castles. I have no sympathy for the view that any kind of research is good. Research should advance a fundamental concept or it should have an obvious practical value and early application. Research is not gadgeteering. It is the pursuit of ideas. With the development of elaborate tools, like flame photometers, ultracentrifuges, angiocardigraphs, ballistocardiographs, electron microscopes, electrophoresis, and isotopes, there has developed a small group who play their instruments for all they are worth. Having acquired the equipment, the buildings, the technicians, and the project grants, they go madly searching for ideas. They scrutinize grant applications if they are on research-allocation committees, they scan published reports, they rush to meetings, they write to their friends, and they ask visiting colleagues for ideas. This is obviously all wrong. Research should start from ideas, and then tools should be obtained, not vice versa."

—LOUIS K. KATZ, M. D.  
in *Journal of American Medical Association*, p. 1137, Mar. 31, 1956

# PSYCHIATRIC PREDICTION AND MILITARY EFFECTIVENESS

## Part 1

ALBERT J. GLASS, *Colonel, MC, USA*

FRANCIS J. RYAN, *Captain, MSC, USA*

ARDIE LUBIN, *Ph. D.*

C. V. RAMANA

ANTHONY C. TUCKER, *Colonel, MSC, USA*

**T**HE proper selection of manpower on the basis of mental capacity and emotional stability remains an unsolved problem of military medicine. In World War II, although 12 per cent of the selectees (1,850,000 men) were rejected for mental deficiency and neuropsychiatric causes, there were approximately 1,000,000 neuropsychiatric admissions to military medical installations, and 545,000 men were discharged from the service for mental defect and diseases.<sup>1</sup> During the postwar years there appeared many reports of follow-up studies and experiences which supported previous impressions regarding the limitations of medical selection in general and the failure of psychiatric screening in particular.<sup>2-6</sup>

There still exists a continuing military requirement to develop reliable means of identifying and thus eliminating unstable and mentally unfit subjects at the induction level. Practical efficiency in selection is of vital importance in time of war and general mobilization. In World War II faulty psychiatric screening substantially reduced the manpower resources available to the Armed Forces, and seriously impeded the military effort by permitting the influx of inductees who were unable to perform satisfactory duty.

As a result of World War II experiences, some military psychiatrists felt that medical and psychiatric selection should exclude only the "lame, the halt, and the blind" or the obviously unfit, and that the basic training period should be used as a practical test of fitness for military duty.<sup>6</sup> This suggestion only repeats the error of equating effectiveness under one set of circumstances, *i. e.*, basic training, with effectiveness under quite

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From Walter Reed Army Institute of Research, Walter Reed Army Medical Center, Washington, D. C.

different and perhaps more stressful conditions. Moreover, difficulties with such a plan are certain to arise when it becomes common knowledge that failure in training is rewarded by discharge from the service.

In the event of general mobilization, realistic considerations demand that some form of psychiatric screening be employed. The fact that effective duplicable methods of psychiatric selection are not available is a strong argument for renewed efforts to improve their accuracy or at least to eliminate selection criteria that have been found to be unreliable.

An opportunity to investigate the problems involved in the prediction of military effectiveness was presented in August 1951 in conjunction with a study initiated by Brill and Beebe.\* Their project required ascertaining the psychiatric status of an inductee group during the Korean campaign for purposes of comparison with similar data derived from World War II participants. The present study\* used the history and clinical impressions that were recorded from this inductee group for the purpose of predicting their subsequent military performance. In addition to reporting upon the results of the psychiatrist's predictions, this presentation will also explore the relationships between the separate components of the psychiatric examination and military performance.

### MATERIALS AND METHODS

**Subjects.** From white inductees who entered six army basic training centers during late August 1951, a random sample of 505 men was selected on the basis of the last digit in their army serial numbers. The subjects originated from 43 states, Alaska, and Hawaii in the following percentages by geographic regions:

Region	Per cent	Region	Per cent
New England	3.6	West North Central	9.3
South Atlantic	5.7	West South Central	1.2
Middle Atlantic	30.1	Mountain	2.2
East North Central	20.2	Pacific	15.4
East South Central	11.1	U. S. Territories	1.2

Age at the time of induction shows the typical range from 17 through 26 years, with 95 per cent of the subjects falling between the ages of 19 and 24.

**Psychiatric Examination.** It should be recognized that the subjects of this study were not raw selectees but a group who had been medically screened and otherwise found acceptable for military service by the usual induction procedures employed during

\*Source of data for this paper is *Psychiatric Prediction and Military Effectiveness*, Research Report No. WRAIR-64-36, Walter Reed Army Institute of Research (to be published).

the Korean campaign. After entry on active duty and within the early weeks of basic training, a complete psychiatric evaluation was accomplished for each subject by the senior psychiatrist assigned to the Mental Hygiene Consultation Service of the respective training center. Each of the six examiners had from 4 to 10 years of training and experience in military psychiatry.

The psychiatric examination was recorded on a special form that was designed to insure a systematic collection of data. This form required the psychiatrist to record his opinion as to subsequent usefulness of the subject if assigned to (1) a combat zone, (2) an active combat area with little or no opportunity for participation in battle, or (3) a noncombat theater of operations. Also included was a rating by the company commander, who, after the subject had completed three weeks of basic training, estimated whether he would become an outstanding, average, or poor soldier.

**Rating of Military Performance.** A complete extract of the service record for each of the 505 men was accomplished in 1954 after most subjects had completed the required two-year period and had been discharged. A few remained for longer periods in the Army, some to re-enlist or accept commissions, and others because of extensive hospitalization or to serve out a sentence of court martial. However, the rating of military performance for all subjects for reasons of consistency was based on the first two years of service only, whether completed or not.

The analysis of military performance was based on the following data:

1. *Information from service records* of each subject that included (a) dates of promotions and demotions; (b) military education and training; (c) combat records; (d) medals and service ribbons awarded; (e) a chronologic list of organizations and stations assigned or attached, with character and efficiency ratings given during each period; (f) pertinent extracts of admissions to army medical installations; (g) disciplinary offenses.

2. *Evaluation of military performance* by the unit commander as recorded on a questionnaire which was sent to the organization concerned in the latter part of the second year of military service. Data from this source were obtained in approximately 50 per cent of the subjects.

After consideration of the above information, the performance of each subject was rated by two of the investigators (AJG and FJR) who had considerable practical experience with the interpretation of service records and the function of troops in combat and noncombat assignments. A four-point scale of military effectiveness was established.

1. *Above average.* In this category were placed individuals whose performance fulfilled one or more of the following conditions: (a) service record notation of a superior efficiency rating for a major assignment of six or more months (military schools or training excluded); (b) positive statements by the company commander in response to the questionnaire that the subject performed outstanding service in his organization; (c) promotion to Sergeant (since only about 15 per cent of the sample attained the rank of Sergeant or higher).

An above-average rating was not given to any subject whose record indicated severe or repeated disciplinary difficulties or lengthy hospitalization for illness (psychiatric or other medical) exclusive of disease peculiar to the military environment, such as hemorrhagic fever, malaria, or battle-incurred injury, *et cetera*.

2. *Average.* This designation was given to individuals whose efficiency was rated as excellent during most of their service and who reached the grade of PFC (Private First Class) or Corporal. Minor disciplinary offenses and moderate periods of illness did not detract from the rating of average.

3. *Below average.* Here were included those subjects whose performance was distinctly inferior as indicated by (a) efficiency ratings of less than excellent during much of their service, or (b) statements by the unit commander that the subject was a poor soldier, and failure of promotion to PFC or demotion to Private.

Below-average ratings were also given to repeated disciplinary problems whose offenses and/or subsequent punishment caused a considerable absence from actual duty status. Similarly, frequent or prolonged hospitalization for medical (including psychiatric) reasons was rated as below-average performance.

4. *Failure.* Under this category were placed subjects who were prematurely separated from the service. Any failure to complete two years of military service was rated accordingly, unless due to combat injury or unavoidable disease, accident, or other circumstances over which it was clear that the individual had no control or influence.

The reliability of categorization was checked by an independent observer\* and more than 90 per cent agreement was found.

## RESULTS

*Performance.* Since all subjects in this study had been accepted for military service in 1951 by routine induction procedures, their subsequent performance affords an opportunity to evaluate the adequacy of medical screening and other selection methods in operation during the Korean conflict. As measured by the rating criteria previously described, table 1 demonstrates that 89 per

\*Capt. H. J. Williams, MC, USA, Chief of the Clinical and Social Psychology Department, Neuropsychiatry Division, Walter Reed Army Institute of Research.

cent of the group were effective soldiers during two years of military service.

TABLE 1. *Military effectiveness during two-year period*

Effectiveness	Inductees	
	Number	Per cent
Above average	146	29
Average	303	60
Below average	24	5
Failure	32	6
Total	505	100

This large proportion of successful soldiers in a random sample of inductees could be construed as strong support for the relaxed standards of psychiatric selection in practice during the Korean campaign. However, it is not generally appreciated that this liberal policy was more than offset by an increase in the number eliminated at induction for inadequate mental ability as measured by the then newly introduced Armed Forces Qualification Test (AFQT). Table 2 illustrates the percentage of inductees disqualified for all reasons during World War II and the Korean conflict.

TABLE 2. *Percentage of inductees rejected during World War II and the Korean action\**

Causes for rejection	World War II 1942-1945 (per cent)	Korean action July 1950-Dec. 1953 (per cent)
Administrative	0.5	0.8
Medical (excluding neuropsychiatric)	18.2	12.9
Mental	11.5	18.7
Mental deficiency**	4.3	13.4
Neuropsychiatric	7.2	2.1
AFQT and medical***	Not applicable	3.2
Total	30.2	32.4

\*From Division of Medical Statistics, Office of the Surgeon General of the Army, Washington, D. C.

\*\*For World War II the term includes men rejected for illiteracy and for low scores on mental tests, as well as morons, idiots, and imbeciles psychiatrically determined. For Korean conflict the term is confined to those who were disqualified on the basis of the Armed Forces Qualification Test (AFQT).

\*\*\*Includes all men rejected for combinations of causes where AFQT was the primary reason for rejection. No comparable category in World War II.

In World War II, standards of rejection for illiteracy and so-called mental deficiency varied from time to time and from one induction station to another. The AFQT, introduced in January 1950, was the culmination of considerable research and effort to obtain a reliable and uniform screening device for intellectual ability.<sup>7</sup> The increase in rejection for mental inadequacy that characterized selection in the Korean conflict may have eliminated many individuals who would have been rejected in World War II for psychiatric reasons. It should be recognized that *rejections for over-all mental causes* during the Korean campaign, rather than being confined to the more obviously unfit as commonly believed, were over 50 per cent more numerous than in World War II. This circumstance may have some bearing upon the relatively low incidence of psychiatric breakdown reported for the Korean period, although other influences, to be discussed below, were perhaps more important in this respect.

Outside of the fact that there was a difference between the mental screening procedures of World War II and those of the Korean campaign, it is difficult to compare the effectiveness of subjects in this study with draftees of World War II for the following reasons:

1. World War II was fought in many different geographic and climatic areas under various conditions of combat and deprivation. Draftees served from one to five years, and the length of time in combat was not specified. In contrast, the Korean conflict involved only one active theater, and during the period in which the subjects of this study participated, a static type of warfare predominated. Active duty was generally limited to two years, and because of the rotation policy introduced in the spring of 1951, *the combat tour was fixed at nine months.*

2. During the Korean action there was a much greater emphasis on rehabilitation and return to duty than on administrative and medical discharge. Figure 1 graphically illustrates a steady decrease in psychiatric and total medical discharge rates following World War II. Despite the moderate rise in frequency of neuropsychiatric and battle casualties during the Korean action (fig. 2), the usual wartime increases in neuropsychiatric and medical discharges did not occur.

3. Unfortunately, few studies have been made that evaluate the over-all effectiveness of World War II participants. Egan, Jackson, and Eanes<sup>8</sup> followed the military careers of 2,054 selectees who had been rejected on at least one occasion for neuropsychiatric reasons and later inducted into the Army. Discharge from the service for psychiatric abnormality was the sole criterion used for designating performance as unsatisfactory. On this basis they found that 82 per cent of the men in their series had performed satisfactory duty as compared to 94 per cent of all enlisted per-

RATE

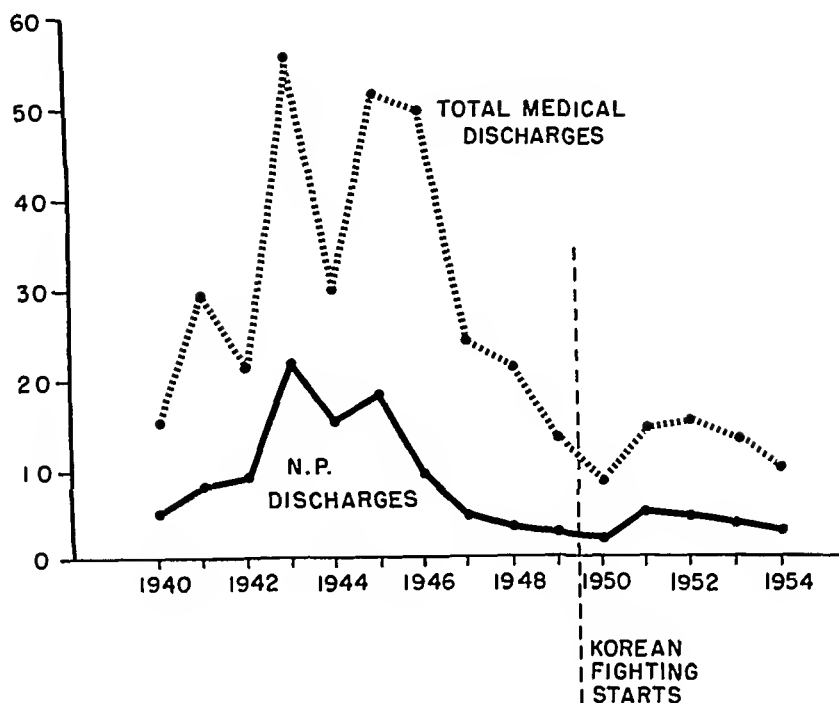


Figure 1. Annual rate of discharge for disability.

RATE

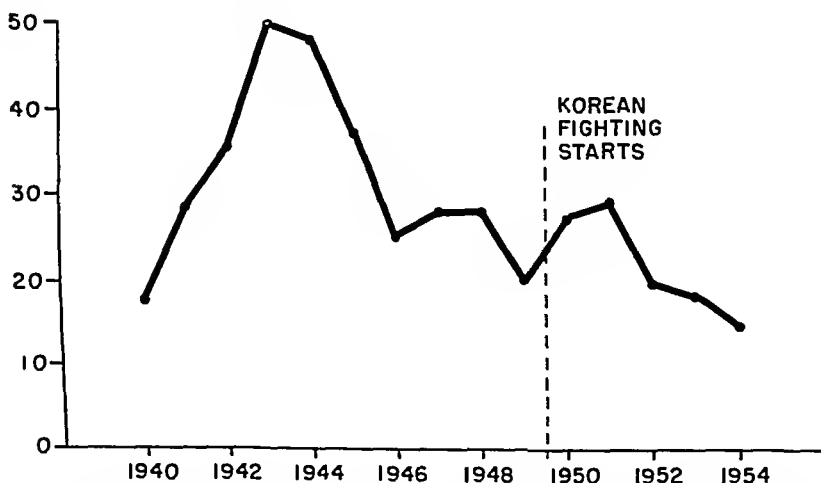


Figure 2. Rate of admissions per 1,000 mean strength for all neuropsychiatric conditions in the United States Army from 1940 to 1954. (From Medical Statistics Division, Office of the Surgeon General)



sonnel in the Army during the same period. These investigators were aware that separation for psychiatric disorder was not the only manifestation of unsatisfactory service and devised a numerical rating system based upon reason for discharge, length of service, efficiency ratings, court martial record, and rank at time of discharge. By this method they found that 78 per cent of their subjects gave satisfactory duty, but a similar survey of a control group was not accomplished.

Aita<sup>4</sup> conducted follow-up studies of two different but numerically equal groups of Army inductees who had been evaluated by brief psychiatric interview and accepted for military service in 1941. One category contained individuals "considered excellent soldier material;" the other group was comprised of "likely failures and borderline candidates." In 1946, medical and personal records pertinent to the subjects were scrutinized and their military performances classified as successful, average, or failure by rating criteria quite similar to that of the present study. By this method, it was found that successful military service was performed by 87 per cent of all 304 subjects, 95 per cent of the group judged as superior, and 79 per cent of those considered as questionable.

Ginzberg and Bray<sup>5</sup> followed up a sample of 400 selectees who were sent to Army Special Training Units during World War II. These men were mostly illiterates, but among them were "slow learners" who had failed the Army mental tests. They found that about 75 per cent of this group performed adequately in regular duty assignments and about 25 per cent achieved the grade of Corporal or higher.

The above studies illustrate a common and important phenomenon, namely, that when soldiers are evaluated for over-all effectiveness during a wartime period a surprisingly large proportion render seemingly adequate and above-average service. This proportion varies from 70 to 80 per cent effectiveness for individuals considered as marginal to 90 to 95 per cent effectiveness for individuals estimated to be in a superior category.

To briefly recapitulate: The effectiveness of the subjects in this study cannot be compared with that of World War II draftees. Therefore, the relative degrees of effectiveness of the psychiatric selection procedures during the Korean period and World War II cannot be determined. The results thus far observed can only be regarded as characteristic for the group under investigation or perhaps for inductees during the Korean conflict.

Attention can now be directed toward considering the accuracy of psychiatric predictions for later military usefulness.

## PREDICTION VS. PERFORMANCE

The military career of the subjects was in no way influenced or altered by the impressions or judgments obtained by the psychiatrists. Subjects continued in basic training, then received further advanced training and were sent to duty stations on the basis of their qualifications and the requirements of the service.

Table 3 gives the geographic distribution of the principal duty assignments performed by the subjects as further modified to conform with the three levels of stress for which prediction of performance has been made.

TABLE 3. *Principal duty assignments by geographic area*

Assignment and area	Inductees	
	Number	Per cent
Noncombat	295	58
Zone of interior	112	22
Overseas	183	36
Active theater	110	22
Korea, rear zone	51	10
Korea, combat support	59	12
Combat	100	20
Korea, front line	100	20
Total	505	100

**Combat.** Psychiatric predictions were made on a four-point scale from above average to poor for each of three major areas of stress.\* The result of this effort for subjects who were assigned to front-line combat units is shown in table 4.

It is evident that none of the forecasts for below-average or poor performance was correct. Indeed, only 7 subjects rendered unsatisfactory duty whereas 21 had been considered as questionable or as likely to fail. It may be argued that the above errors in prediction occurred because combat stress was less severe than had been anticipated by the psychiatrists or experienced in World War II. Of the 100 subjects assigned to combat units, there were 4 killed in action and 14 wounded. This ratio of 18 per cent battle casualties is probably less than that suffered by combat troops in World War II. Although comparable statistical data are not available, there was a battle loss of 36.5 per cent in the combat elements of one division over an 11-month period during the Italian campaign of World War II.<sup>10</sup> The fact that the degree of

\*Predictions were originally made on a five-point scale which has been modified to correspond with the four-point rating of performance.



somewhat uncharitable but apt caption to one of his drawings, referred to individuals of this category as "garritroopers" who were "too far forward to wear ties and too far back to git shot." For the purpose of this study, combat support units were considered similar to rear echelon assignments in Korea insofar as battle stress was concerned, and performance in these units has been compared with prediction for duty in an active theater.

Table 5 demonstrates that the examining psychiatrists also underestimated the performance capabilities of the combat support group. Ninety-six per cent of these subjects gave satisfactory service in contrast to 70 per cent that were so predicted. It is probable that such gross errors in psychiatric prediction are based upon a failure to consider the unique and favorable situational advantages that are enjoyed by men assigned near the combat zone. Here, proximity to the actual fighting provides some of the excitement of combat with little of the risk. Furthermore, troops in such a role have a tangible, worthwhile objective, namely, to support and supply the less fortunate front-line troops who must bear the brunt of danger and deprivation. Practical experience indicates that relatively few psychiatric situational disorders occur in men assigned to this area.

TABLE 5. *Prediction vs. performance in a combat support zone (total sample)*

Performance	Prediction					
	Above average 20	Average 21	Below average 13	Poor 5	Total	
					No.	%
					59	100
Above average	15 (75%)*	6	2	0	23	39
Average	5	15 (71%)*	10	4	34	57
Below average	0	0	0 (0%)*	1	1	2
Poor	0	0	1	0 (0%)*	1	2

\*Correct prediction

**Rear or Logistical Zone.** Individuals in this category also perform support and supply functions but are even further removed from the active combat area. In this study they are represented by the subjects assigned to the rear in Korea. Table 6 gives their effectiveness as contrasted with psychiatric prediction.

Similar to the previous results, effective performance (90 per cent) was better than anticipated. None of the subjects rendered poor performance, but there were five instances of below-average duty. The over-all performance of the rear echelon group in Korea was somewhat less effective than that of subjects assigned to the combat support zone or front-line combat. There are situational circumstances peculiar to the rear or logistical zone of an active theater which adversely influence effectiveness, namely:

battle trauma which may be encountered cannot be predicted is one of the inherent defects in any effort to predetermine combat effectiveness.

Despite the foregoing evidence of only moderate combat severity in the Korean campaign of 1952 and 1953, table 4 indicates that psychiatric prediction of behavior in combat was unduly pessimistic. This attitude of the psychiatrists is not surprising, since battle is considered to be the most severe form of military stress and therefore the logical situation to produce a breakdown of so-called predisposed or vulnerable individuals. However, such a simple stress-predisposition formula ignores the powerful supportive influences that may come from buddies, group unity, leadership, and other circumstances of the combat situation.<sup>11</sup>

TABLE 4. *Prediction vs. performance in combat (total sample)*

Performance	Prediction				
	Above average 20	Average 59	Below average 12	Poor 9	Total 100
Above average	9 (45%)*	24	3	2	38
Average	11	31 (52%)*	8	5	55
Below average	0	3	0 (0%)*	2	5
Poor	0	1	1	0 (0%)*	2

\*Correct prediction

The examining psychiatrists of this study were not alone in their inability to accurately predict future combat effectiveness. Plesset,<sup>12</sup> a division psychiatrist in World War II, reported that many individuals who were considered to be poor risks prior to combat functioned adequately under battle conditions, and relatively few became psychiatric casualties. Similar results were obtained by Glass<sup>10</sup> in an effort to predict the combat effectiveness of infantry replacements by psychiatric evaluation. Indeed, it is the rule rather than the exception for psychiatrists and others to underestimate the capacity of individuals to perform satisfactory combat duty.

**Combat Support Zone.** This category includes Army and division service troops, such as engineer, signal, medical, ordnance, headquarters, and other units that function immediately to the rear of the actual fighting and are awarded battle stars for their participation. Combat casualties are rarely incurred by these units except under unusual circumstances, such as an unexpected enemy breakthrough. They suffer relatively little of the physical deprivations and discomforts commonly endured by front-line troops. Mauldin,<sup>13</sup> the well-known World War II cartoonist, in a

somewhat uncharitable but apt caption to one of his drawings, referred to individuals of this category as "garritroopers" who were "too far forward to wear ties and too far back to git shot." For the purpose of this study, combat support units were considered similar to rear echelon assignments in Korea insofar as battle stress was concerned, and performance in these units has been compared with prediction for duty in an active theater.

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Poor	0	0	1	0 (0%)*	1	2

\*Correct prediction

**Rear or Logistical Zone.** Individuals in this category also perform support and supply functions but are even further removed from the active combat area. In this study they are represented by the subjects assigned to the rear in Korea. Table 6 gives their effectiveness as contrasted with psychiatric prediction.

Similar to the previous results, effective performance (90 per cent) was better than anticipated. None of the subjects rendered poor performance, but there were five instances of below-average duty. The over-all performance of the rear echelon group in Korea was somewhat less effective than that of subjects assigned to the combat support zone or front-line combat. There are situational circumstances peculiar to the rear or logistical zone of an active theater which adversely influence effectiveness, namely:

battle trauma which may be encountered cannot be predicted is one of the inherent defects in any effort to predetermine combat effectiveness.

Despite the foregoing evidence of only moderate combat severity in the Korean campaign of 1952 and 1953, table 4 indicates that psychiatric prediction of behavior in combat was unduly pessimistic. This attitude of the psychiatrists is not surprising, since battle is considered to be the most severe form of military stress and therefore the logical situation to produce a breakdown of so-called predisposed or vulnerable individuals. However, such a simple stress-predisposition formula ignores the powerful supportive influences that may come from buddies, group unity, leadership, and other circumstances of the combat situation.<sup>11</sup>

TABLE 4. *Prediction vs. performance in combat (total sample)*

Performance	Prediction				
	Above average 20	Average 59	Below average 12	Poor 9	Total 100
Above average	9 (45%)*	24	3	2	38
Average	11	31 (52%)*	8	5	55
Below average	0	3	0 (0%)*	2	5
Poor	0	1	1	0 (0%)*	2

\*Correct prediction

The examining psychiatrists of this study were not alone in their inability to accurately predict future combat effectiveness. Plesset,<sup>12</sup> a division psychiatrist in World War II, reported that many individuals who were considered to be poor risks prior to combat functioned adequately under battle conditions, and relatively few became psychiatric casualties. Similar results were obtained by Glass<sup>10</sup> in an effort to predict the combat effectiveness of infantry replacements by psychiatric evaluation. Indeed, it is the rule rather than the exception for psychiatrists and others to underestimate the capacity of individuals to perform satisfactory combat duty.

**Combat Support Zone.** This category includes Army and division service troops, such as engineer, signal, medical, ordnance, headquarters, and other units that function immediately to the rear of the actual fighting and are awarded battle stars for their participation. Combat casualties are rarely incurred by these units except under unusual circumstances, such as an unexpected enemy breakthrough. They suffer relatively little of the physical deprivations and discomforts commonly endured by front-line troops. Mauldin,<sup>13</sup> the well-known World War II cartoonist, in a

somewhat uncharitable but apt caption to one of his drawings: referred to individuals of this category as "garritroopers" who were "too far forward to wear ties and too far back to get shot." For the purpose of this study, combat support units were considered similar to rear echelon assignments in Korea insofar as battle stress was concerned, and performance in these units has been compared with prediction for duty in an active theater.

Table 5 demonstrates that the examining psychiatrists also underestimated the performance capabilities of the combat support group. Ninety-six per cent of these subjects gave satisfactory service in contrast to 70 per cent that were so predicted. It is probable that such gross errors in psychiatric prediction are based upon a failure to consider the unique and favorable situational advantages that are enjoyed by men assigned near the combat zone. Here, proximity to the actual fighting provides some of the excitement of combat with little of the risk. Furthermore, troops in such a role have a tangible, worthwhile objective, namely, to support and supply the less fortunate front-line troops who must bear the brunt of danger and deprivation. Practical experience indicates that relatively few psychiatric situational disorders occur in men assigned to this area.

TABLE 5. *Prediction vs. performance in a combat support zone (total sample)*

Performance	Prediction					
	Above average 20	Average 21	Below average 13	Poor 5	Total	
					No.	%
					59	100
Above average	15 (75%)*	6	2	0	23	39
Average	5	15 (71%)*	10	4	34	57
Below average	0	0	0 (0%)*	1	1	2
Poor	0	0	1	0 (0%)*	1	2

\*Correct prediction

**Rear or Logistical Zone.** Individuals in this category also perform support and supply functions but are even further removed from the active combat area. In this study they are represented by the subjects assigned to the rear in Korea. Table 6 gives their effectiveness as contrasted with psychiatric prediction.

Similar to the previous results, effective performance (90 per cent) was better than anticipated. None of the subjects rendered poor performance, but there were five instances of below-average duty. The over-all performance of the rear echelon group in Korea was somewhat less effective than that of subjects assigned to the combat support zone or front-line combat. There are situational circumstances peculiar to the rear or logistical zone of an active theater which adversely influence effectiveness, namely:



1. Personnel assigned to rear units are quite removed from the battle scene and cannot readily perceive the results of their work or the importance of their role in the over-all military effort.

2. Boredom and the frustrations of monotonous living are common, along with a greater opportunity to indulge in activities which lead to disciplinary infractions.

It should be apparent that each level of a combat theater has its own specific situational circumstances which play a larger role in determining the over-all effectiveness of assigned personnel than previous personality characteristics or so-called predisposition.

TABLE 6. *Prediction vs. performance in rear echelon groups in Korea (total sample)*

Performance	Prediction					
	Above average 9	Average 28	Below average 12	Poor 2	Total	
					No.	%
Above average	3 (34%)*	7	1	0	11	22
Average	6	18 (64%)*	10	1	35	68
Below average	0	3	1 (8%)*	1	5	10
Poor	0	0	0	0 (0%)*	0	0

\*Correct prediction

**Noncombat Overseas Theater.** This category includes subjects who served in such noncombat theaters as Japan, Germany, the Canal Zone, and Alaska. The performance of this group as related to psychiatric prediction is given in table 7. This predictive effect also indicates a similar underestimation of ability to endure military stress, in this instance, separation from home and the United States.

**Zone of the Interior.** Subjects in this category remained in the United States during their entire tour of military service. Presumably such assignment represents the least amount of external stress and, therefore, the most favorable environment for satisfactory adjustment. Table 8 gives the results of prediction for duty in a noncombat area.

From a scrutiny of table 8, one might be led to conclude that the United States was the most stressful of all duty areas, since almost one fourth of the assigned subjects were unable to complete two years of military service. In actuality this result is an artefact, because most of the failures (16 out of 26) occurred during or shortly after the training phase or within a 5-month period after induction. Thus, failure in the zone of the interior

primarily indicates difficulties that were encountered in the transition from civil to military life rather than the influence of conditions peculiar to service within the United States.

TABLE 7. *Prediction vs. performance in overseas noncombat theaters (total sample)*

Performance	Prediction					
	Above average 46	Average 94	Below average 35	Poor 8	Total	
					No.	%
					183	100
Above average	14 (30%)*	17	3	1	35	19
Average	31	72 (77%)*	27	5	135	74
Below average	0	4	4 (11%)*	2	10	5
Poor	1	1	1	0 (0%)*	3	2

\*Correct prediction

TABLE 8. *Prediction vs. performance in the zone of the interior (total sample)*

Performance	Prediction					
	Above average 43	Average 42	Below average 18	Poor 9	Total	
					No.	%
					112	100
Above average	25 (58%)*	9	5	0	39	35
Average	15	23 (55%)*	5	1	44	39
Below average	0	0	3 (17%)*	0	3	3
Poor	3	10	5	8 (89%)*	26	23

\*Correct prediction

Psychiatric prediction achieved a superior efficiency in identifying subjects (88.8 per cent) who failed in the zone of the interior or early in their military career in contrast to the negative results that were obtained in the individuals of this category who were sent overseas. It would seem reasonable to postulate that overt signs of psychiatric or mental abnormality can forecast later adjustment over a relatively brief time period provided the environment is not radically altered, as occurs under conditions of overseas or combat assignment.

The entire matter of accuracy in psychiatric prediction was re-evaluated on the basis of a more simplified scoring system which rated prediction and performance as either (1) satisfactory, which combined the former average and above-average criteria, or (2) unsatisfactory, that represented both previous categories of below average and poor or failure. With this method, correct estimations were made by the psychiatrists in 78 per cent of the

subjects assigned to nonbattle areas (United States and overseas noncombat theaters), 72 per cent of the subjects stationed in an active theater (rear echelon in Korea and combat support zone), and 78 per cent of those sent to combat units. This relative similarity in the efficiency of prediction for all types of assignment reflects the inability of the examining psychiatrists to distinguish any particular vulnerability that might be specific for each of the three levels of stress. In fact, no such differentiation was attempted for most subjects, and usually psychiatric predictions were identical for assignment in combat, an active theater, or a noncombat zone. The results of the simplified scoring system are shown in tables 9 and 10.

TABLE 9. *Efficiency of prediction for satisfactory performance (total sample)*

Area	Above average or average		Efficiency of prediction (per cent)
	Prediction	Performance	
Zone of interior	85	72	85
Overseas noncombat	140	134	96
Rear Korea	37	34	92
Combat support zone	41	41	100
Combat (front line)	79	75	95
Total	382	356	93

TABLE 10. *Efficiency of prediction for unsatisfactory performance (total sample)*

Area	Below average or poor		Efficiency of prediction (per cent)
	Prediction	Performance	
Zone of interior	27	16	59
Overseas noncombat	43	7	16
Rear Korea	14	2	14
Combat support zone	18	2	11
Combat (front line)	21	3	14
Total	123	30	24

Table 9 illustrates that the psychiatrists attained a high degree of accuracy in their selection of subjects for satisfactory service. However, except for assignment in the United States, their predictions of unsatisfactory duty were usually erroneous (table 10). It is this inability to determine in advance the potential

below-average or poor soldier that is the basic unsolved difficulty of psychiatric selection. In general, too many individuals are considered to be of unsatisfactory caliber or of questionable value for military service. The larger number of correct predictions of unsatisfactory service in those subjects who served in the United States confirms the impression gained from table 8, namely, that some early military failures manifest sufficient or unmistakable evidence of such abnormal tendencies at induction or during basic training, which permits a more reliable estimation of later performance. In fact, three of the subjects who were rated as poor risks by the psychiatrists were being processed for premature discharge from the service at the time of the psychiatric examination. However, efforts to estimate later unsatisfactory performance past the initial months of service are most difficult because of a greater number of unforeseeable events which may operate for or against successful adjustment.

The data of this study presented an opportunity to compare the efficiency of psychiatric prediction with that of line officers. Their judgments of military usefulness were based entirely upon information relative to the behavior of the subjects during three weeks of basic training. In fact, since company commanders cannot be expected to have personal knowledge of each trainee within a three-week period, it is quite likely that the major sources of their information concerning the subjects were observations of sergeants and other members of the training cadre.

Unit commanders rated each man on a three-point scale (outstanding, average, or poor) without reference to any particular area of duty assignment. When the simplified scoring criteria of satisfactory and unsatisfactory were applied, forecasts by the line officers were found to be 84 per cent correct as compared to 76 per cent correct for all psychiatric predictions. Results of line-officer estimation for satisfactory and unsatisfactory duty are illustrated in table 11.

TABLE 11. *Efficiency of prediction by training officers*

Rating	Prediction	Performance	Efficiency of prediction (per cent)
Satisfactory (outstanding or average)	444	407	92
Unsatisfactory (poor)	59	17	29
Total	503*	424	84

\*Two cases not rated by training officers.

Table 11 demonstrates that the company commanders were also unable to identify unsatisfactory subjects with a high degree of accuracy. The judgments of training officers as to future performance were remarkably similar to the effectiveness of psychiatric prediction despite the difference in training and experience between psychiatrists and line officers and the fact that dissimilar types of information were used by each group in arriving at decisions for later military usefulness.

The results of line officers' predictions cast strong doubts on the frequently repeated statement that basic training itself should be used as a practical screening device for military service.\* Possibly the unit commanders' predictions of unsatisfactory performance might have improved if more time were available for observation. However, the potential inadequacy of most men who failed was not distinguishable by line officers within the first three weeks of basic training.

The somewhat less effective predictions of psychiatrists were due largely to their tendency to overestimate the size of the failure group. This tendency to overestimate failure can be ascribed at least in part to psychiatrists' acute awareness of personality deviations, potential neurosis, and latent abnormal behavior in the subjects. The greater technical knowledge of psychiatrists insures that a large number of potentially deviant and seemingly vulnerable subjects will be identified. However, if predictions of future performance are made primarily on the basis of defective personality or predisposition with little regard to later situational factors, many errors in prediction are inevitable.

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(To be concluded)

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#### PSYCHONEUROTIC PATIENTS—YEARS LATER

A follow-up study of a representative sample of World War II veterans who had suffered psychoneurotic breakdown during their military service also showed generally favorable results with respect to their condition at time of follow-up about five years after their breakdown. In this study most of the veterans were interviewed by psychiatrists at follow-up. It was found that 85 per cent of the men were gainfully employed, and all but a small proportion of these were in full-time employment. Two thirds of them had had no psychiatric treatment after discharge from the service, and in only 2 per cent had there been intensive or prolonged treatment by psychiatrists. Less than 10 per cent showed evidence at follow-up of serious psychiatric disability.

—*Statistical Bulletin*  
Metropolitan Life Insurance Company  
p. 3, Apr. 1955

## NATIONAL RESOURCES CONFERENCES

1956 - 1957

The National Resources Conferences are presented in 16 cities each year by a team of Army, Navy, Marine, and Air Force officers from the faculty of the Industrial College of the Armed Forces. The Conference seeks to foster a better understanding of the many interrelated problems associated with national security, including economic, social, political, military, psychological, and technological factors.

Each conference is a 2-week session, 4 hours each day and 5 days a week. Applications for attendance at the Conferences should not be sent to the Industrial College. Military officers who wish to attend should apply through normal official channels. Active duty training credits are provided for by pertinent regulations.

The Conference schedule for 1956-1957 is as follows:

Birmingham, Ala.....	17 Sept. - 28 Sept. 1956
Denver, Colo. ....	24 Sept. - 5 Oct. 1956
Tucson, Ariz. . . . .	22 Oct. - 2 Nov. 1956
Butte, Mont. . . . .	22 Oct. - 2 Nov. 1956
Hartford, Conn. ....	26 Nov. - 7 Dec. 1956
Augusta, Ga. ....	26 Nov. - 7 Dec. 1956
Ventura, Calif. . . . .	21 Jan. - 1 Feb. 1957
Beaumont, Tex. ....	21 Jan. - 1 Feb. 1957
Jacksonville, Fla. ....	18 Feb. - 1 Mar. 1957
Roanoke, Va. ....	18 Feb. - 1 Mar. 1957
San Antonio, Tex. ....	18 Mar. - 29 Mar. 1957
Akron, Ohio . . . . .	18 Mar. - 29 Mar. 1957
Hutchinson, Kans. . . . .	15 Apr. - 26 Apr. 1957
Providence, R. I. . . . .	15 Apr. - 26 Apr. 1957
New York, N. Y. ....	6 May - 17 May 1957
San Diego, Calif. ....	13 May - 24 May 1957

# DIFFERENTIATION OF THE CLOSTRIDIA ASSOCIATED WITH MEDICAL SPECIMENS

## A Biochemical Method

JOHN D. MARSHALL, Jr., *Captain, MSC, USA*  
THEODORE F. WETZLER  
TOSHIO KAWATOMARI

THE ROUTINE differentiation of the members of the genus *Clostridium* in the average hospital laboratory is a source of frustration to both clinician and bacteriologist.<sup>1,2</sup> Although organisms belonging to this group are less often encountered than pathogenic species of other genera, their recognition is of equal importance. The presence of any toxigenic clostridia in a wound may result in serious complications unless rapid diagnosis and subsequent treatment are afforded. The ability of certain clostridia to liberate powerful toxins, which affect the patient physiologically while causing only minimal early local reactions, is one of the insidious features of this group of organisms.<sup>3-5</sup> The ubiquity of clostridia in the normal human environment affords ample opportunity for them to gain entrance into a wound, whether externally or internally induced.<sup>6-10</sup>

The standard methods used for culturing routine laboratory specimens of human origin are woefully inadequate for the isolation of clostridia. Not only are the species of *Clostridium* fastidious in their nutritional and physical requirements<sup>11,12</sup> but they are usually outgrown by coexisting aerobic species in media containing the necessary factors for their proliferation. In instances where methods are employed that enable the isolation of all members of the genus *Clostridium* in pure culture, the determination of the physiologic characteristics of the isolated strains presents additional difficulties. Media used for the detection of biochemical reactions of the aerobic bacteria are not favorable for the multiplication of clostridia. This necessitates the use of a specific set of media which will support optimal growth of the clostridia and insure reproducible results.

The interpretation of the findings may be a further complicating factor, for various workers ascribe different characteristics to the same species.<sup>13-15</sup> Some taxonomic keys are not consistent



throughout in reporting the reactions used, making it difficult to find mutually exclusive reactions.<sup>14</sup> Other keys depend upon a single reaction to separate closely related species.<sup>14</sup> If for some unforeseen reason the key reaction is altered, an erroneous classification results. Where time is a critical factor, which is the case in most gas gangrene studied, it is impossible to perform repeated studies to verify the results before rendering a report.

Many rapid screening tests have been devised for the presumptive identification of the more common pathogenic clostridia.<sup>16-20</sup> These tests are of great value but they eliminate in no way the necessity for the isolation, study, and identification of the entire microbial flora present in a given specimen.

In an earlier communication a rapid method for the isolation of clostridia from grossly contaminated cultures by selective inhibition of the aerobic flora was advanced.<sup>11,22</sup> The purpose of this article is to present a further step in clostridial studies, that is, to describe a method for differentiating the more common clostridia. The media used are described and the biochemical reactions obtained are enumerated and compiled into a chart which, with two exceptions, is mutually inclusive for all species of *Clostridium* tested. The key is set up to give as many points of species differences as possible without becoming unduly complex.

## MATERIALS

All media here described were adjusted to pH 7.4, dispensed in 10 ml amounts into culture tubes (15 by 125 mm), and sterilized by autoclaving for 15 minutes at 15 pounds' pressure unless otherwise noted in the text. The media were stored at room temperature until used. If excess oxidation occurred during the time of storage, the media were heated to drive off the absorbed oxygen and cooled rapidly just prior to being inoculated.

The compositions of the various media used to determine the physiologic reactions of the genus *Clostridium* were as follows:

### Sugar-Free Thioglycollate Broth for Fermentation Reactions

Nutrient broth*	8.0 g
Pancreatic digest of casein*	5.0 g
Sodium thioglycollate	1.0 g
Sodium chloride	2.5 g
Agar	0.8 g
Distilled water	1.0 L
Resazurin (0.1 per cent solution)	1.0 ml

With the exception of starch and inulin, all carbohydrates were added in 1 per cent concentration prior to tubing and sterilizing. Starch and inulin were added in 0.4 per cent concentration.

\*Baltimore Biological Laboratory or the Difco Laboratories.

**Indol Medium**

Pancreatic digest of casein*	10.0 g
Sodium chloride	5.0 g
DL-tryptophane	0.5 g
Dextrose	1.0 g
Agar	1.0 g
Distilled water	1.0 L

**Nitrate Medium**

Pancreatic digest of casein*	10.0 g
Sodium chloride	5.0 g
Beef extract*	2.5 g
Sodium thioglycollate	1.0 g
Potassium nitrate	1.0 g
Distilled water	1.0 L
Resazurin (0.1 per cent solution)	1 ml

**Motility Medium**

Thioglycollate broth*	29.5 g
Agar	4.2 g
Distilled water	1.0 L

**Gelatin Medium**

Thioglycollate broth*	29.5 g
Gelatin	60.0 g
Sodium sulfite	0.1 g
Distilled water	1.0 L

**Bromocresol Purple Iron-Milk**

Whole milk (homogenized)	1.0 L
Bromocresol purple (0.4 per cent)	4.0 ml

Ten ml aliquots of this medium were dispensed into 16- by 150-mm tubes, each containing 1 iron nail.

**Acrolein Medium**

Yeast extract (10 per cent solution)	50.0 ml
Pancreatic digest of casein*	15.0 g
Agar	0.8 g
Glycerol	20.0 ml
Sodium thioglycollate	0.5 g
Sodium chloride	2.5 g
Cysteine hydrochloride (1 per cent solution)	5.0 ml
Distilled water	930.0 ml

The prepared medium was dispensed in 100 ml aliquots into 4 oz prescription bottles. The sterile bottled medium was stored in a refrigerator, and, just prior to inoculation, 2.5 ml were transferred to a 13- by 100-mm Wassermann tube.

\*Baltimore Biologics Laboratory or the Difco Laboratories.

### Hydrogen Sulfide Medium

Trypticase iron lactoso agar medium\* was used to determine the production of hydrogen sulfide.

### Toxin-producing Medium

Two media were found satisfactory for the production of clostridial toxins and were used alternately in this laboratory.

#### *Ross's Horse Muscle Infusion Broth*<sup>21</sup>

Horse muscle infusion broth .....	700 ml
Papain digest of horse muscle .....	10 ml
Cooked horse meat particles .....	300 g

#### *Modified Robertson's Chopped Heart Medium*<sup>24</sup>

Chopped beef heart .....	450 g
Proteose peptone No. 3* .....	20 g
Dextrose .....	2 g
Sodium chloride .....	5 g
Sodium hydroxide (1N solution) .....	30 ml
Distilled water .....	1 L

The prepared broth was dispensed into screw-capped tubes (15 by 150 mm), and a sufficient amount of chopped meat particles was added to make up 30 per cent of the final volume.

### Yeast Extract

Dehydrated yeast .....	10 g
Distilled water .....	100 ml

The 10 per cent solution of yeast extract was prepared by boiling the dehydrated yeast in distilled water for 10 to 15 minutes. The mixture was filtered through gauze and cotton and placed in a refrigerator for 48 hours. The supernatant was then decanted and sterilized by Seitz filtration.

### Production of Hydrogen Gas for Anaerobiosis

Hydrogen gas for charging Brewer jars was generated by using zinc and 30 per cent hydrochloric acid in a generator designed by Sanders and reported in the 406th Medical General Laboratory Annual Report.<sup>22</sup> Figure 1 shows the component part of the apparatus.

## METHODS

Once a strain was isolated in pure culture, two tubes of sugar-free thioglycollate broth were inoculated and incubated for 18 to 24 hours. These tubes were used as seed cultures for the biochemical examinations.

\*Baltimore Biological Laboratory or the Difco Laboratories.

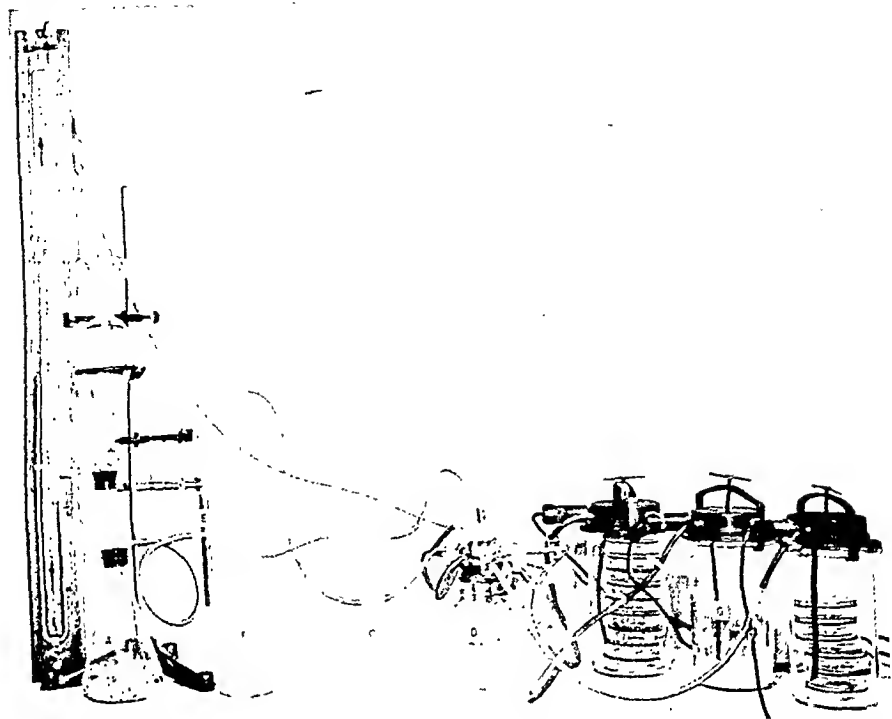


Figure 1. Hydrogen generator apparatus for Brewer anaerobic jars. (A) Generator: mossy zinc and 30 per cent hydrochloric acid; (B) one per cent silver nitrate solution rinse; (C) water rinse; (D) distributor jar with water rinse; (E) mercury column safety valve; (F) manometer; (G) Brewer anaerobic jars.

Sets of tests comprised of the following media were used: bromocresol purple iron-milk medium; carbohydrate fermentation medium with glucose; lactose; sucrose; maltose; salicin; manitol; starch; galactose; glycerol; inulin; trehalose; mannose and alpha-methyl-glucoside, respectively; indol medium; nitrate medium; motility medium; gelatin medium; hydrogen sulfide medium; acrolein medium; and toxin-producing medium. All except the last two were each inoculated with 0.3 ml of the culture below the surface, using a 5 ml pipet. Acrolein and toxin-producing media were inoculated with 0.5 ml each in the same manner. Solid media were stabbed. All tests, with the exception of the indol medium, were incubated aerobically. The indol test medium was incubated anaerobically in a Brewer jar in hydrogen atmosphere. Reactions were read after 48 hours and recorded.

Pathogenicity tests were performed at the same time by inoculating 0.8 ml of the whole culture in toxin-producing broth into the right hind leg of a guinea pig weighing about 400 grams. The leg was disinfected and traumatized with a hemostat before the

injection. Daily observations were made on the animals for local lesions, and autopsy was performed on those animals which died to determine the cause of death.

## RESULTS

Table 1 gives the results of the reactions used for the classification of the clostridia more commonly encountered in laboratory specimens of human origin. All media used supported the growth of every *Clostridium* strain tested. The reactions were as follows:

**Bromocresol Purple Iron-milk.** Species producing the "stormy fermentation" reaction in milk did so without exception during the first 24 hours of incubation. Organisms which reacted with "acid digestion" were less active, usually requiring 48 hours to complete the process. Acid clot reactions were observed to be complete after 48 hours' incubation, while the group of organisms that were not supposed to alter milk, that is, the "no change" group of clostridia, did not alter the milk after 10 days' incubation.

Several forms of milk were tested as substitutes for whole milk. The most uniform results were obtained by using reconstituted homogenized whole milk. Satisfactory results were obtained also by using powdered whole milk in 10 per cent concentration. Skimmed milk did not give reproducible results with strains isolated in this laboratory.

**Carbohydrate Fermentation.** Acid production from various carbohydrates was determined by adding 1 ml of 0.04 per cent bromocresol purple indicator solution after 48 hours' incubation. The indicator solution was not incorporated into the media prior to inoculation since *Clostridium* strains reduce organic indicators to a leuco state. Thus the indicator had to be added after the incubation.

Since all species did not produce the same degree of acidity, two tubes in each set were used as controls. Dextrose was invariably fermented by every strain capable of attacking any carbohydrates and was, therefore, used as a positive control. A tube of sugar-free thioglycollate broth inoculated at the same time as the biochemical tests was used as the negative control. This was considered necessary because certain species are capable of attacking the basal medium with an alteration of pH and production of gas. For this reason, gas formation was not recorded. With these two extremes for the indices of acid production, all other carbohydrates were read as positive, doubtful, or negative.

**Indol Production.** The production of indol was detected by adding 1 ml of Kovac's reagent to the test culture and inverting the

test tube to facilitate mixing. A positive test was manifested by the appearance of a distinct wine-colored layer above the medium.

The use of a medium containing a reducing agent, such as sodium thioglycollate, did not give satisfactory results in this laboratory in testing for indol formation.

**Reduction of Nitrate to Nitrite.** The presence of nitrite was determined by using Tittsler's method. The appearance of a red color upon the addition of 1 ml each of the two reagents was recorded as a positive test. The production of nitrite was the criterion for a positive test. If the reduction continued beyond the nitrite stage, the test was considered negative.

**Motility.** Motility was manifested by uniform turbidity in the semisolid thioglycollate medium, while nonmotile organisms showed a discrete line of growth along the stab. Some difficulties were encountered with certain species of *Clostridium perfringens* which produced excessive quantities of gas in the medium. This nonmotile organism was found to grow profusely along the fracture lines caused by the gas formation, which on cursory examination could be interpreted as motility. Closer observation of the submerged colonies, however, demonstrated the nonmotile nature of this species.

**Gelatin Liquefaction.** Liquefaction of gelatin was considered to have occurred when the inoculated medium failed to solidify when placed in a refrigerator at 4°C for 1 hour. The strains capable of digesting gelatin liquefied the medium after 48 hours' incubation, and strains that were incapable of digesting gelatin within 48 hours remained negative even after 10 days' incubation.

**Acrolein Production.** Production of acrolein is specific for *Cl. perfringens* among the obligate, spore-forming anaerobes. Heller's method,<sup>14</sup> using modified Schiff's reagent to determine the formation of acrolein from thioglycollate-glycerol medium, together with the "stormy" fermentation of milk, were used as presumptive tests for identifying *Cl. perfringens*. All strains of this species, however, did not form acrolein. A negative test, therefore, does not rule out a *Cl. perfringens*. Classification in this case should be made on the basis of the results obtained from the evaluation of all the other biochemical tests.

**Hydrogen Sulfide Production.** The production of hydrogen sulfide was revealed by varying degrees of blackening of the medium, depending upon the species tested. Any darkening of the test medium was considered as a positive test.



Inoculation of the nonpathogenic species in the same manner failed to produce any demonstrable lesion.

**Production of Hydrogen.** The use of hydrogen gas is the method of choice for producing the anaerobic condition necessary for the growth of clostridia in media lacking chemical reducing agents. The explosiveness of hydrogen gas presents a safety hazard in the laboratory, but this danger is substantially eliminated by the use of the generator apparatus shown in figure 1.<sup>25</sup> The attachment of a regulating valve prevents the formation of excessive pressure within the system, thus eliminating the possibility of a blow-out. This apparatus has been in use for a number of years without a single accident in a room where Bunsen burners are used simultaneously.

### DISCUSSION

The routine isolation, separation, and classification of members of the genus *Clostridium* is of paramount importance in the hospital laboratory. Because of the difficulties involved in working with this group of organisms, however, many institutions have not undertaken the cultural studies of clostridia as a routine procedure. In those instances where members of this group are the causative agents of infection, lack of experience with the proper procedures necessary for their rapid identification is the cause of undue delay in the diagnosis. The series of tests outlined in this article should alleviate the problems involved in the classification of the clostridia. The system outlined in table 1 is by no means the only method which can be used for the classification of the genus *Clostridium*. This classification is applicable only when the media and methods outlined in this article are followed. It is of great importance to read the biochemical reactions after 48 hours. In the preparation of the media, any deviation from the formula given may cause an alteration in the specificity or intensity of the reactions. This in turn will negate the value of table 1 for the differential diagnosis of the clostridial species.

The application of this system has certain advantages which make it particularly suitable for the hospital laboratory. Media and reagents used are normal stock items and special equipment is kept to a minimum. Highly trained personnel are not necessary. The tests are simple and do not require complex manipulations. The results are well defined, eliminating the necessity for differential interpretation. The difficulties involved due to strain variation were taken into account and variable reactions were eliminated as key points in the classification.

The value of colonial morphology cannot be overlooked in the scheme of classification of the genus *Clostridium*. Classical descriptions of the various species are available.<sup>13</sup> A word of



warning, however, should be given on colonial variation. Dissociation is a common phenomenon in recently isolated strains, and several colonial phases of the same species may be observed on the same single plating medium. When more than one plating medium is used, the colonies of a given strain also appear in different morphologic forms on each medium. Thus, until the worker becomes completely familiar with the appearance of various morphologic forms on the medium routinely used, care must be exercised not to misinterpret these findings. Likewise, cellular morphology varies depending upon the source of the smear. Table 1 lists the usual shape and location of the spores within the cells. This does not imply, however, that every strain of a species on all media will show the same picture.

Serologic procedures for the identification of clostridia are based on two different criteria. The first is the serologic typing of bacterial somatic and flagella antigenic patterns.<sup>26</sup> The second consists of a typing based on the identification of the toxins produced by certain species.<sup>27</sup> Both methods are of extreme value in research. The present nonavailability of the required antisera limits the practical application of these procedures in the hospital laboratory. Due to the multiplicity of the antigenic fractions found within each species and the complexity of the toxin combinations, the local production of typing antisera is impractical. Where typing of subspecies is of importance, such as in *Clostridium botulinum* and *Cl. perfringens*, cultures should be forwarded to laboratories equipped for such work.

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## THE DOCTOR AND THE PATIENT

The evolution of the doctor-patient relationship, as I have experienced it in the 40 years since I first began caring for patients, has been in the realms of the psychologic, the sociologic, and the economic. It will continue in such ways, I believe, until every person has access to medical care of the highest quality which existing medical knowledge affords, and when he can obtain it in a manner which itself imposes no hardship upon him. I hope we shall have the genius to achieve this end by voluntary effort, but we cannot do so unless we are willing to break new trails.

—J. H. MEANS

in *Bulletin of the New York Academy of Medicine*, p. 732, Sept. 1953

## MILITARY MEDICO-DENTAL SYMPOSIUM

A symposium of unusual scope and interest has been scheduled for all personnel of the Armed Forces at the U. S. Naval Hospital, Philadelphia, Pa., 22 to 27 October 1956. The six-day program of medical and dental subjects will have as its theme topic "The Medical Aspects of Hemispherical Defense." In addition to the general sessions there will be sections on surgery, medicine, dentistry, nursing, psychiatry, the Medical Service Corps, aviation medicine, ophthalmology, and otolaryngology. Of special interest will be the opportunity to tour a hospital ship, a submarine, and the Naval Air Development Center at Johnsville.

Speakers and moderators of panel discussions will include Dr. Elmer Hess, Past President, American Medical Association; Major General Silas B. Hays, MC, USA, Surgeon General, U. S. Army; Major General I. S. Ravdin, MC, USAR, Professor of Surgery, University of Pennsylvania School of Medicine; Dr. Richard E. Shope, Member, Rockefeller Institute for Medical Research; Rear Admiral E. H. von Heimburg, USN, Commandant, Fourth Naval District; Dr. Stanley M. Levenson, Chief, Department of Surgical Metabolism, Walter Reed Army Institute of Research; and Brigadier General Harold G. Scheie, MC, USAR, Professor of Ophthalmology, University of Pennsylvania School of Medicine.

Programs, attendance applications, and additional information may be obtained by addressing the District Medical Officer, Building No. 4, U. S. Naval Base, Philadelphia 12, Pa. Arrangements have been made to award retirement point credits for Army, Air Force, and Naval Reserve officers in attendance.

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*Errata:* In the September 1956 issue (pages 1384-1385) an error was made in the listing of the following named officers; they were promoted to the permanent grade of Captain, USAF, in the Corps indicated:

EGGETT, Earl H. (MSC)  
McINTOSH, Billy D. (MSC)  
PLOCK, William L. (MSC)  
RADER, Marjorie A. (MSPC)

DUNNUM, Delores L. (NC)  
DUPLICATE, Margaret L. (NC)  
VSETULA, Josephine M. (NC)  
WORKMAN, Betty J. (NC)

# ENDEMIC Q FEVER IN SOUTH TEXAS

PHILIP J. SNODGRASS, *Lieutenant, MC, USNR*

**F**ROM July 1954 to December 1955, 53 patients with a diagnosis of primary atypical pneumonia were admitted to this dispensary. Attempts to establish a specific serologic diagnosis proved fruitless until September 1955 when two patients' sera showed, during the acute illness, a diagnostic rise in complement fixation titer to *Coxiella burnetii* (*Rickettsia burnetii*). A survey of convalescent patients who were still at this command, dating back 17 months, yielded 12 of 19 with positive titers of 1:10 or greater to Q fever antigen. One of two further acute cases studied also showed a rising titer. Using these 15 patients with proven cases as models, 18 additional patients, who were lost to serologic follow-up, were selected for their similar clinical, laboratory, roentgenographic, and epidemiologic findings. These 33 cases, all personally observed by the author, are presented to exemplify endemic Q fever as it occurs in south Texas.

## CLINICAL FEATURES

**Signs and Symptoms.** In agreement with the literature,<sup>1-4</sup> the onset was acute, with constitutional symptoms of fever, chills, headache, and myalgia predominating over respiratory symptoms of chest pain and cough. The patients sought medical attention early—on the average, two days after onset. Headache was severe, paralleling the degree of fever, but it was not the pre-eminent complaint as noted in Derrick's<sup>1</sup> original cases, nor was it associated in our series with retro-orbital pain, photophobia, and lacrimation, as has been stressed.<sup>4-6</sup> Influenzalike muscle, bone, and backaches were usually described. Chest symptoms were volunteered only occasionally by the patient; when sought for, a pleuritic pain or feeling of tightness or aching and dry, mild cough were elicited in a third of the patients. More than half described a prodrome of feeling vaguely unwell for a day prior to the onset of fever. Stiff neck, actually a part of the myalgia, was volunteered chiefly during the poliomyelitis season. No rash, icterus, arthritis, epididymitis, or conjunctivitis were noted in our series. The frequency of the various symptoms is recorded in table 1 and compared with that in 180

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From U. S. Naval Auxiliary Air Station, Kingsville, Tex. Dr. Snodgrass is now at 119 Maple St., Belmont, Mass.



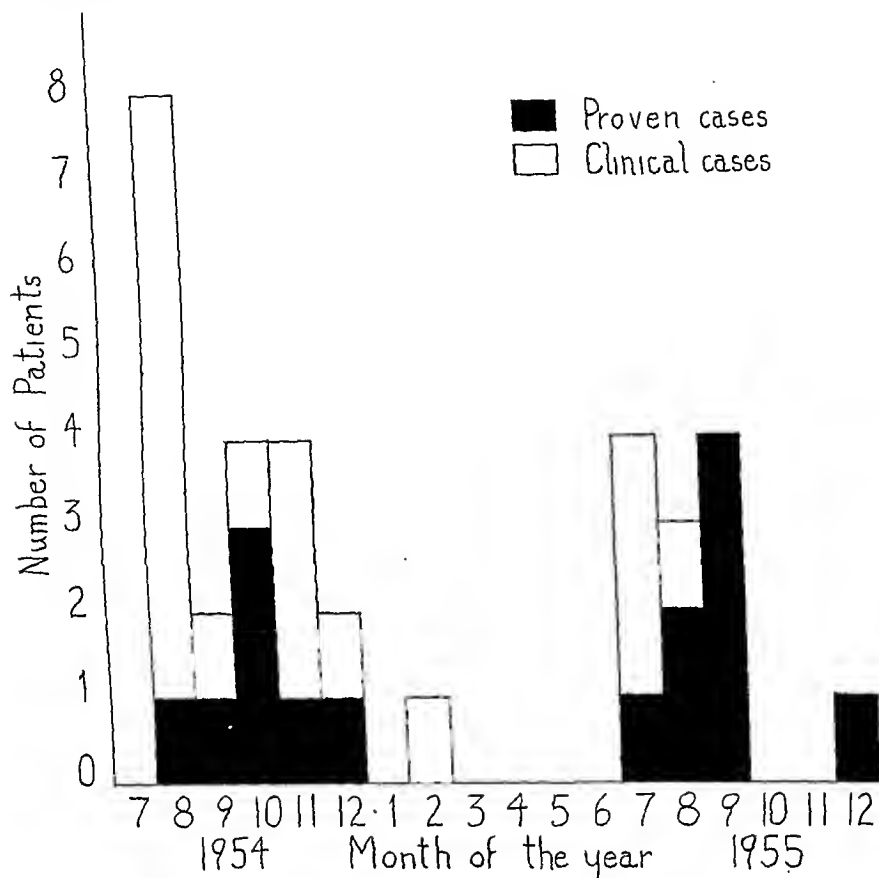


Figure 1. Seasonal variation of Q-fever cases.

**Laboratory Findings.** The routine blood studies helped considerably to delineate the Q fever patients. White blood cell counts in the proven cases averaged on admission 10,000/ $\mu$ l, with a similar mean and a range of 5,700 to 13,000/ $\mu$ l. The clinical cases had an average of 9,600, a mean of 9,400, and a range of 5,200 to 13,000/ $\mu$ l. Differential white blood cell counts on the average revealed 67 per cent segmented polymorphonuclears, 6 per cent bands, and 25 per cent lymphocytes. An occasional to as many as 8 per cent of the lymphocytes were noted to be atypical, identical with those seen in infectious mononucleosis. The erythrocyte sedimentation rate (Cutler method) on admission averaged 16 mm per hour in both groups. The reported pattern of a rising white blood cell count and falling sedimentation rate over the first 21 days of Q fever<sup>9</sup> could not be confirmed due to inadequate follow-ups. Cold agglutinins, on admission and in two to three weeks, were negative in all 33 patients. Urinalysis in acute cases was unremarkable, and albuminuria was not noted as in Derrick's cases.

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October 1956)

of pulmonary finding—the pleuritic type. Thickened pleural shadows and prominent fissures are seen.



*Figure 2. Roentgenogram showing pleuritic type of pulmonary finding in Q fever; thickened pleural shadows and prominent fissures are here combined as usual with alveolar type. The middle-lobe fissure thickening was present one year later.*

One patient presented what is felt to be a rare complication of Q fever: spontaneous pneumothorax. He entered the hospital with acute fever, chills, and malaise, and on the second day showed a large left upper lobe peribronchitic type of lesion, but a white blood cell count of  $12,700/\mu\text{l}$ , normal differential, and sedimentation rate of 22 mm per hour. On chlortetracycline hydrochloride (aureomycin) the temperature slowly returned to normal and he was discharged on the 13th day, with minimal roentgenographic findings remaining. He returned the next day with a 20 per cent collapse of his left upper lobe, and after ex-



One patient, who was not studied serologically but who had typical clinical, laboratory, and roentgenographic findings, underwent lumbar puncture because of a stiff neck and a positive Kernig's sign. This revealed a clear spinal fluid at a pressure of 190 mm of fluid, a total cell count of 1 polymorphonuclear leukocyte and 6 lymphocytes, and a protein of 125 mg per 100 ml. The only other patient in the literature with meningeal signs in Q fever<sup>10</sup> had *C. burnetti* cultured from the spinal fluid and showed 243 cells/ $\mu$ l, 70 per cent being lymphocytes.

Serologic studies on three patients with acute cases are summarized in table 2.

TABLE 2. Complement-fixation titers to *C. burnetti* in three Q fever patients\*

Patient	Day of disease	Complement fixation titer
1	7	negative 1:5
	18	positive 1:40
	60	positive 1:40
2	17	positive 1:10
	55	positive 1:160
3	4	positive 1:10
	36	positive 1:320

\*Serologic studies were carried out by the Department of Vires and Rickettsial Diseases, Walter Reed Army Institute of Research, Washington, D. C.

Studies on 11 patients were positive in titers of 1:320 to 1:10 from 5 to 17 months after onset of the disease. Additional studies on those with acute cases and at random on the others were all negative for cold and streptococcus MG agglutinins, psittacosis group antibodies, influenza hemagglutinins, and the RI virus<sup>11</sup> group antibodies.

**Roentgenographic Findings.** Despite the fact that in one reported series of patients with proven Q fever<sup>2</sup> 69 of 80 random chest films were normal, all patients here showed clear-cut pulmonary lesions on roentgenographic examination. Since the distribution was not lobar or segmental, the lesions were grouped by dividing the lung fields into zones by three equidistant horizontal lines, as reported in Q fever by Feinstein, Yesner, and Marks.<sup>9</sup> This study of the epidemic in troops returning from Italy in 1945 showed a predominance of lower zone distribution, i. e., upper third, 10 per cent; middle third, 40 per cent; and lower third, 50 per cent. The present series is quite similar—upper zone, 18 per cent; middle zone, 36 per cent; and lower zone, 46 per cent—evenly divided between the two lungs. Figure 2 shows one type

ber have many dust storms. Local physicians report that the Texas Department of Health found evidence of Q fever in this area in humans, cattle, and raw milk in 1948. Therefore it is apparent that military establishments in south Texas are in an endemic Q fever area. Considering the many subclinical or undiagnosed cases, the true incidence must be considerable.

Diagnosis by complement fixation studies is time-consuming and difficult; this may explain the few cases of Q fever reported in Texas in the past five years. Experience in Europe with intradermal Q fever antigen<sup>23,24</sup> has shown that a delayed type reaction can be elicited on the third to eighth day of the disease, and remains positive up to four years. The agreement with complement fixation test is only 76 per cent. The skin test unfortunately renders the complement fixation test positive at low dilutions. For diagnosis where laboratory facilities are limited and for epidemiologic surveys, such an antigen would be of great value in this country. In a self-limited disease in which mortality is slight, solving the problem by eliminating ticks from domestic and wild animals over a large area seems impractical, particularly since it can be treated effectively.

In conclusion, it is felt that the signs and symptoms here described, though common to atypical pneumonias, when combined with the distinctive routine blood studies and roentgenographic findings allow one to make the diagnosis of Q fever with accuracy in an area where the disease is endemic.

#### SUMMARY

During an 18-month period (1954-1955) 15 patients with serologically proven Q fever and 18 otherwise identical patients with Q fever were admitted to the dispensary at this air station. A review of their signs, symptoms, and laboratory and roentgenographic findings reveals a distinctive clinical picture. The epidemiology of Q fever is reviewed in light of recent advances reported in the literature.

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tensive investigation at St. Albans Naval Hospital he was discharged with the impression that this was not secondary to tuberculosis but to the atypical pneumonia. Though not studied serologically, this patient's picture is quite consistent with that in those with proven Q fever.

**Clinical Course.** All but one patient were febrile on the ward, their temperatures usually spiking to from 103° to 105°F in the evening, responding poorly to salicylates, and returning toward normal by morning. After about five days the patients usually felt clinically well and were afebrile; they were able to resume full duty in about seven days without significant weakness, fatigue, or depression.<sup>3</sup>

**Treatment.** In the treatment of Q fever, Clark, Lennetto, and Meiklejohn<sup>12</sup> demonstrated a significant difference between aureomycin, effective against *C. burnetti* in vitro, and penicillin, ineffective as a control. The temperature returned to normal in three days on the tetracycline derivative, compared with eight days on the average with penicillin. Five patients here on aspirin or penicillin became afebrile in an average of 4.2 days. The duration of fever in 25 patients treated with various tetracyclines averaged 3.6 days, a not significant difference.

## DISCUSSION

The original reported cases of Q fever in Australia,<sup>1</sup> and those in returning U. S. troops from Italy in 1945<sup>13,14</sup> and in stockyard workers in San Antonio, Tex.,<sup>15</sup> were epidemic in occurrence. Since the studies in California<sup>2,16</sup> and in Texas,<sup>16</sup> however, it has become apparent that Q fever is more common as an endemic disease. This is borne out by the world-wide surveys of Q fever in humans, animals, and arthropods.<sup>17</sup> The reservoir of *C. burnetti* is domestic and wild animals and their infesting ticks. In Australia<sup>18</sup> the tick, *Boophilus*, and in the United States *Dermacentor andersoni* and the Lone Star tick, *Amblyomma americanum*,<sup>19,20</sup> have been implicated. The method of spread to humans is rarely by tick bite, as in Rocky Mountain spotted fever. A brilliant series of investigations in California<sup>21,22</sup> established that the disease is air-borne, contracted by inhalation of dust contaminated by dried tick feces or animal excreta. Such infection is more common in dry, dusty seasons. *Rickettsiae* can be isolated from floor dust in dairy barns or from animal hides. Less commonly the organism is shed from the infected lacteal ducts of dairy cattle.<sup>23</sup> Raw milk or milk pasteurized by methods other than the high temperature-short time method can spread the disease, since *C. burnetti* is fairly resistant to heat.<sup>24</sup>

This air station is surrounded by semiarid beef and dairy cattle country. The seasonal incidence corresponds to the active, multiplying stages of cattle ticks, and the months from June to Novem-

her have many dust storms. Local physicians report that the Texas Department of Health found evidence of Q fever in this area in humans, cattle, and raw milk in 1948. Therefore it is apparent that military establishments in south Texas are in an endemic Q fever area. Considering the many subclinical or undiagnosed cases, the true incidence must be considerable.

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*A patient comes to see you. When you believe that an assistant can do your job as well, you are on the way out.*

—Martin T. Fischer

# A PSYCHIATRIC SERVICE AS A THERAPEUTIC COMMUNITY

## II. Ten-Month Study in the Care of 939 Patients

HARRY A. WILMER, *Commander, MC, USNR*

**T**HE CORE of the concept of the therapeutic community in psychiatric management is the deep conviction that everyone, patients and staff, is part of the community in which the total effort all of the time should be devoted to the treatment of patients. By "treatment" is meant not only conventional therapy, often limited to therapeutic interviews or administration of drugs, but the total milieu of which the staff constitute elements equally important to that of the psychiatrist. It is a family unit not unlike a ship's company; in this, however, the hierarchy of command serves the primary function of helping the crew to understand their conflicting feelings, statements, and attitudes.

In a sense, the therapeutic community here described may be thought of as a brief "corrective" emotional experience directed to problems of socialization and acculturation. To this end, it was felt essential that each nurse and corpsman share with the physician a general knowledge of the patients' difficulties, particularly those influencing their socialization difficulties in the service and on the ward. By a process of sharing (though not sharing confidences of a high order of importance), staff interest was focused upon the reality of the present, the here and now, and the ego problems of the patients. For this purpose, the receiving ward of the psychiatric service at this hospital was conducted as a therapeutic community<sup>1</sup> for a period of 10 months, during which time 939 patients passed through the ward, remaining for an average stay of 10 days.

While the more unconscious or subtle meanings of delusional material in the schizophrenic patient were of undoubted importance, the emphasis was for the most part upon the reality misinterpretation, the inconsistencies, the faulty logic, and the meta-communication. Cognizance of the psychoanalytic implications and interpretations notwithstanding, these were not brought to the patients' awareness in the ward culture except under unusual circumstances. There was no effort to meet all patients' needs,

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From U. S. Naval Hospital, Oakland, Calif. Comdr. Wilmer is now assigned to Naval Medical Research Institute, National Naval Medical Center, Bethesda, Md.

and many, in fact, were consciously—and it was thought, therapeutically—frustrated. Above all, effort was bent toward preventing at all cost the fragmentation of staff or patients, the splintering and disruptive or destructive subgroup formation. Theoretically, the ingroup comprised the entire ward, varying in number from 12 to 34 patients. The staff ingroup was composed of all corpsmen and nurses, and the social worker, psychologist, and psychiatrist.

By the device of daily group meetings, immediately after ward rounds and lasting for 45 minutes at the beginning of each day, it was felt that a "tone" or "atmosphere" was fostered which could reasonably be expected to carry through for the entire day. This patient-group meeting, ritualistically preceded by the formal military sick call and followed by a more informal group or ward meeting, emphasized in a dramatic but subtle manner the dual role of the ward medical officer, both officer and doctor, administrator and therapist. There was no attempt to separate these two functions except in time and by nonverbal communication. At sick call the doctor was saying "I am a Navy Medical Officer"; when he sat quietly and comfortably waiting for the group to assemble or to talk he was saying not only "I am now physician" but also "You can think of me now, if you wish, as nonofficer."

This communication was, needless to say, tested at once by the more verbal, or the more mobile, patients. If they found that previously repressed or "dangerous" thoughts and words avoked neither condemnation nor punishment, they might test further or they might accept what they wished to believe, namely, "Things are as they seem, I am safe." But what doubts still crept in these were commonly dealt with not in the patient-doctor constellation, but in the community constellation—i. e., doctor, staff, patient group; and for the most part, the therapeutic reinforcement came from the other patients, verbally or nonverbally. They behaved as if what the testing patient wanted to believe were true. This was the ward culture, and came about through hard and intensive work.

Immediately after the ward meeting, the staff analyzed and discussed the ward behavior, the individual patients, and the group. These meetings began with a chart being drawn on the blackboard indicating where everyone had sat, hence there was visual presentation of both patients and staff together as a group at the ward meeting.

The long-term evaluation of the "effectiveness" of this ward culture and therapy upon the schizophrenic, neurotic, or character disorder patients is beyond the scope of this investigation. What was carefully studied and documented was the speed with which patients became acculturated to a hospital and accepted themselves as patients—particularly the painful reality of being

"mental" patients; the signs of group cohesiveness or lack of cohesiveness; the effect of the ward on the psychotic symptoms, particularly delusions and hallucinations; how the patients' need for nightly sedation decreased, and how their assaultive behavior largely ceased.

By the process of daily group meetings (at first Monday through Friday, but later continued through Saturday) there was a continual "confrontation" of staff by patient, patient by staff, and staff by staff, as well as of patient by patient. The mere sitting down together with all the outward manifestations of socially acceptable behavior was considered of importance, the regarding of one another for 45 minutes and the comfort of silence being unusual and salutary social therapeutic experiences. There was continual attention to, but no open criticism of, objectional social behavior; for example, the unacceptability of scattering cigarette ashes on the floor was demonstrated by a staff member quietly handing a patient an ash tray. This clue was picked up by patients, who treated each other as the staff had done. Patients were encouraged to sit down, because that is what is done in meetings, though it was not insisted upon. They were expected to attend meetings, and with a few exceptions complied after persistent persuasion on the part of the staff. If they did not, it was expected that a staff member would try to return a wandering patient to the group, and if this failed, the doctor would try to bring the patient back, suggesting as he left that the group carry on without him, which it invariably did. Corpsmen and nurses were encouraged to talk in the meetings, though their participation was variable. The staff was encouraged to sit dispersed throughout the group but the patients were allowed to sit where they chose.

Patients were told that "we" did not use the "quiet" or seclusion room on this ward. Of the 939 patients, totally unselected, a great many had been brought in in restraints; others had been kept in seclusion rooms for days, weeks, or a month during their previous hospitalization. They were all treated as though restraint were not necessary, and it was indicated to them that they were expected to control themselves and maintain a degree of emotional order. Moreover, they were not given sleeping pills except in emergencies.

This being a military hospital, the exceptions to the above must be considered because during the night the psychiatric Officer of the Day had responsibility for the care and treatment of the psychiatric service, both the receiving ward and the remaining psychiatric service, which at the end of the 10-month period had a census of about 250 patients. During the night on five occasions, officers of the day placed a patient in a seclusion room on the receiving ward. They also ordered sleeping pills occasionally when requested.



Tranquilizing drugs, used sparingly in the first four months of the study, were used more frequently in the last six. At first, it was felt necessary to find out if the social environment, the culture, and the essential community feeling would of themselves be strong enough forces to influence human behavior in a highly therapeutic manner. When this was confirmed to our satisfaction, the question then to be answered was: Could the forces be enhanced by use of the new drugs? Our impression was that they definitely could be, particularly with the hyperactive, aggressive patient.

In the five months preceding the operation of the therapeutic community, 540 patients were admitted and received 328 sleeping pills and 58 injections of barbiturates. In the last five-month period of the therapeutic community, 543 patients were admitted and received 23 sleeping pills, 20 of these ordered by the Officer of the Day. Nineteen parenteral injections of barbiturates were given, 17 of them by the Officer of the Day.

It was felt that abolishing all forms of physical restraint and not using the seclusion room were of signal importance. It was not that under unusual circumstances we might not have had recourse to restraint or seclusion room, nor that this would in any way have disproved the basic concept of the therapeutic community, but that these methods were not necessary. Yet an exception might still require their use under unusual circumstances. The lack of the necessity of using quiet rooms or restraints is a commentary on the self-restraint and quiet functioning of the ward staff as well as the patients. On only one occasion was it necessary to give electric shock treatment on the receiving ward. For the most part, patients conducted themselves in a serious, friendly, occasionally humorous fashion. The ward was rarely so disturbed that it looked like a "mental hospital." It looked like any medical or surgical ward, except that the doors were locked.

Although patients remaining on the ward for only 10 days created a rapidly changing group the culture was surprisingly stable. Perhaps because of the kaleidoscopic nature of this busy ward, the relative permanency of the staff was of great importance and reassurance to the patients. This was clearly an advantage over those wards on which patients remain through numerous staff changes. Similarly, it was felt that the military service was indeed a favorable climate for the therapeutic community. The intercurrent staff changes which did occur were not of great significance to the patients, for the charge nurse, the ward medical officer, the social worker, and the psychologist remained throughout the entire study period, except for brief periods of a few days.

More detailed studies are in progress on the nature of this experience and will be published at a later date.

# HIGH-SPEED ROTARY SURGICAL GRINDING OF THE SKIN

EDGAR D. GRADY, *Lieutenant Commander, MC, USNR*

**E**XCELLENT cosmetic improvement of certain skin blemishes has been accomplished by grinding with a wire brush or steel bur driven by a high-speed rotary electric motor. I have found that a motor of which several types are available in hardware stores and hobby shops (fig. 1), with a speed of 25,000 to 30,000 rpm and having an attached wire brush 2 cm in diameter and 2 mm in thickness (fig. 2), is satisfactory for skin planing the following defects: (1) acne scars of the face, (2) accidental traumatic tattoos, (3) art tattoos, (4) surgical and traumatic scars, (5) keloids, and (6) seborrheic verrucae. A steel bur attachment to the same motor has proved effective in removing plantar warts and verrucae of the fingers. The safest and most satisfactory method of anesthesia for these operations is local infiltration with procaine hydrochloride containing a vasoconstrictor.

The use of motor-powered rotary steel burs to produce abrasion for the removal of pitted acne scars and tattoos was first reported in 1905 by Kromayer.<sup>1</sup> In 1935 Janson<sup>2</sup> described the removal of tattoos by hand-powered wire brush. High-speed (30,000 rpm) rotary abrasion apparatus with a protective sleeve was reported to give excellent results in skin planing by Schreus<sup>3</sup> in 1949. In 1953 Kurtin<sup>4</sup> received much attention for his report of dermal abrasion with a wire brush driven by a 12,000-rpm motor. Eller<sup>5</sup> at first used sandpaper for dermal abrasion, and later reported his results, with ethyl chloride anesthesia, using a 12,000-rpm motor turning a wire brush. Later experience with a 30,000-rpm motor proved more satisfactory in Eller's<sup>6</sup> hands and was as easily performed on flaccid, anesthetized skin as on frozen skin. Buncke<sup>7</sup> stressed the advantages of local infiltration anesthesia over ethyl chloride. Iverson<sup>8</sup> reported an additional use for dermal abrasion. He found that abrasion of the edges of facial wounds prior to suture gave a nearly invisible healing line. The dangers of sandpaper abrasion have been emphasized by the reports of silica granulomata made by Buley and Kulwin<sup>9</sup> and Epstein.<sup>10</sup>

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The National Science Foundation has announced that the reports on results of government-sponsored scientific research of an unclassified nature will henceforth be made more widely available to scientists everywhere. Specifically, the program, designated Government Research Information, is designed to assist any research scientist to:

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The use of motor-powered rotary steel burs to produce abrasion for the removal of pitted acne scars and tattoos was first reported in 1905 by Kromayer.<sup>1</sup> In 1935 Janson<sup>2</sup> described the removal of tattoos by hand-powered wire brush. High-speed (30,000 rpm) rotary abrasion apparatus with a protective sleeve was reported to give excellent results in skin planing by Schreus<sup>3</sup> in 1949. In 1953 Kurtin<sup>4</sup> received much attention for his report of dermal abrasion with a wire brush driven by a 12,000-rpm motor. Eller<sup>5</sup> at first used sandpaper for dermal abrasion, and later reported his results, with ethyl chloride anesthesia, using a 12,000-rpm motor turning a wire brush. Later experience with a 30,000-rpm motor proved more satisfactory in Eller's<sup>6</sup> hands and was as easily performed on flaccid, anesthetized skin as on frozen skin. Buncke<sup>7</sup> stressed the advantages of local infiltration anesthesia over ethyl chloride. Iverson<sup>8</sup> reported an additional use for dermal abrasion. He found that abrasion of the edges of facial wounds prior to suture gave a nearly invisible healing line. The dangers of sandpaper abrasion have been emphasized by the reports of silica granulomata made by Buley and Kulwin<sup>9</sup> and Epstein.<sup>10</sup>

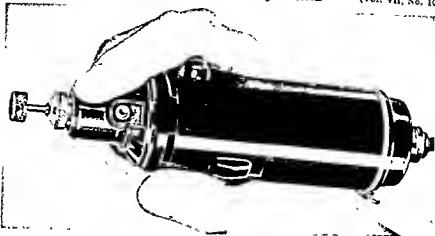


Figure 1. One form of a motor which may be used for skin planing. (Photograph by courtesy of the Dremel Manufacturing Co.)

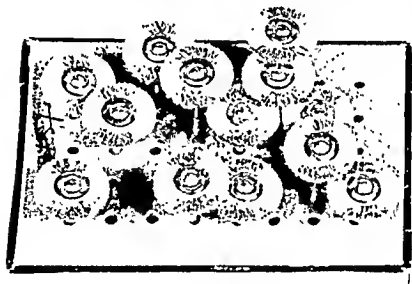


Figure 2. Spare wire brushes made of stainless steel, measuring 2.0 cm in diameter and 0.2 cm in thickness. It was found advisable to strengthen brushes used. With higher speed motors, this has not

The psychic benefit obtained by i  
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planing. Removal of embarrassing tattoos (figs. 3 through 5) gave the patients a new self-confidence, particularly in family relationships. For example, the family of a 19-year-old man refused to let him come home until he had a tattoo removed. Another man had a tattoo on his abdomen, which his wife insisted be removed.



*Figure 3. Tattoo before planing. Figure 4. Same tattoo four days after planing.*

A warrant officer who had numerous tattoos over all extremities and trunk was only embarrassed by those on his fingers, which were the only ones visible when he was fully dressed. Another example was a 35-year-old man who had carried dark foreign-body blemishes over the bridge of his nose since a traumatic gravel brush injury many years earlier (figs. 6 and 7). An elderly man had an unattractive seborrheic verruca of his forehead, easily eradicated by planing (figs. 8 and 9). One sailor was especially happy to see his fiancée after he had obtained a smooth complexion where once he had had acne scars.

Warts on the fingers are painlessly and most efficiently removed by high-speed grinding with a steel bur. I have found this method to be the least disabling and to result in the quickest healing. The same applies to the treatment of plantar warts. There is no eschar (as is present with coagulating or dessicating methods) to mar the visibility in this method of treating warts. By



*Figure 3. A tattoo 10 days after planing. Further improvement continued for the next 6 weeks.*

examining the bed at the site of grinding with a magnifying glass, one can remove the last remnants of the white glistening wart, as suggested by Prazak and Thomas<sup>11</sup> in their eurentement method. Minimal surrounding tissue is removed, and there is very slight disability. In fact, with a soft padded dressing on the foot, the patient usually experiences less discomfort in walking after the procedure than he did before it.

All the above-mentioned procedures are done on an outpatient basis. Dressings are applied and the patient returns to work on the following day, or even on the same day if he wishes.

After trying various methods of anesthesia, I have found that local infiltration with procaine containing a vasoconstrictor (2 per cent procaine hydrochloride containing 10 drops of epinephrine 1:1000 per ounce) is best. The use of a sponge soaked in saline solution containing a vasoconstrictor (0.5 ml of epinephrine in 4 ounces of saline) to sponge away the slight accumulation of oozing blood during the planing, further improves hemostasis and visibility. Ethyl chloride freezing can be condemned for several

reasons: (a) The period of anesthesia is fleeting, limiting the care with which planing can be accomplished. (b) The frost of ethyl chloride disguises the lesion to be planed. (c) In the last few seconds of anesthesia with ethyl chloride, the skin becomes flaccid, the hemostatic effect is lost, and the revolving brush



*Figure 6. Accidental foreign-body tattoo and scarring of nose and cheek.*



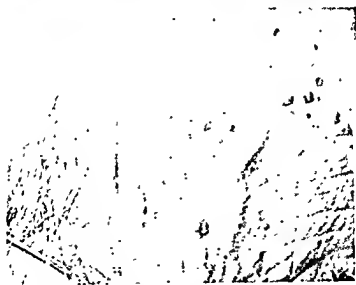
*Figure 7. After planing accidental foreign-body tattoo of nose and cheek.*



sprays blood and epithelial debris in spite of a brush shield. (d) Ethyl chloride is a potent general anesthetic and as such has largely been abandoned because of numerous fatalities—usually cardiac arrest.<sup>12,13</sup> Although the blower used with this technic disperses the vapor, it is not uncommon for the patient to become very excited or to lose consciousness. (e) Ethyl chloride is explosive and flammable. (f) A well-trained assistant is indispen-



*Figure 8. Seborrheic verruca before planing.*



*Figure 9. Seborrheic verruca after planing.*

sable<sup>14</sup> when using ethyl chloride, whereas the grinding done under local infiltration anesthesia requires no assistant. Freon<sup>15,16</sup> has been recommended as a substitute for ethyl chloride, but while it is not explosive, other disadvantages are still inherent in the freezing method. By use of motors of 25,000 rpm and up, instead of the 12,000 rpm recommended by Kurtin<sup>4</sup> and others,<sup>1,3</sup> it has been found that there is no advantage in having rigid skin.

Depth of planing is controlled by careful observation, using judgment gained with experience. The depth is comparable to that used in taking split thickness skin grafts, and the appearance after planing resembles a fresh donor site. In planing tattoos, it is sometimes difficult to eradicate every vestige of pigment, and at times it may be best to leave a few pigment dots behind in order not to produce excessive scarring. The regrowth of hair may disguise the residuals of a few pigment dots. The depth of pigment in the skin is variable, depending on the way it was placed by the tattoo artist, on the type of skin, and on the age of the tattoo. It generally has been found that the older the tattoo, the deeper it is, but the majority of tattoos can be completely removed with no residual and with minimal scarring. Antibiotic dressings with hydrocortisone seem to minimize scar formation.

Planing for acne scars is much simpler, provided the disease process is quiescent. There is little danger of going too deep, and almost no scarring as a result of the planing itself. If infected or sebaceous cystic lesions are present, five-minute scrubs twice daily with a soap containing hexachlorophene are used for two or three weeks preoperatively. Residual cysts are marsupialized by planing and their vertical walls smoothed away to make the bottom of the cyst nearly level with the surrounding skin. This is the only way some areas of chronic cystic acne may be cleared up, especially when located around the ears and neck.

The raw areas are dressed with an antibiotic ointment and fine mesh gauze. Bacitracin ointment has been satisfactory in most cases. Recently, oxytetracycline and hydrocortisone ointment has been used with equally good results. It seems to be more effective in keloid formers. Epithelization and healing is usually complete in from 10 to 14 days. There remains some temporary hyperemia, but color has satisfactorily returned toward normal within 2 to 3 months.

#### SUMMARY

High-speed (25,000 to 30,000 rpm) motor-driven wire brush surgical planing offers a satisfactory method of improving acne scars of the face, accidental traumatic tattoos, art tattoos, surgical and traumatic scars, keloids, and seborrheic verrucae. A steel bur attachment to the same motor has proved effective in

sprays blood and epithelial debris in spite of a brush shield. (d) Ethyl chloride is a potent general anesthetic and as such has largely been abandoned because of numerous fatalities—usually cardiac arrest.<sup>12,13</sup> Although the blower used with this technic disperses the vapor, it is not uncommon for the patient to become very excited or to lose consciousness. (e) Ethyl chloride is explosive and flammable. (f) A well-trained assistant is indispen-



*Figure 8. Seborrheic verruca before planing.*



*Figure 9. Seborrheic verruca after planing.*



## Clinicopathologic Conference

Tokyo Army Hospital, APO 500, San Francisco, Calif.\*  
406th Medical General Laboratory, APO 500, San Francisco, Calif.\*\*

### COUGH, DYSPNEA, AND ABDOMINAL PAIN

**Summary of Clinical History.** A 21-year-old white male Army private was admitted initially to a hospital in Korea on 15 December 1954. He was transferred from there to this hospital four days later with a history of cough and shortness of breath of two months' duration. One month prior to admission he had experienced onset of pain in the epigastrium in the region of the xiphoid process. The shortness of breath had progressively increased and the cough was productive of mucoid sputum. There was no history of hemoptysis or edema and at no time had there been chest pain or radiation of pain to either arm or to the neck. There was no history of rheumatic fever or known contact with tuberculosis.

There was no nausea, vomiting, or diarrhea, and bowel movements were normal. There was no dysuria, polyuria, or hematuria.

**Physical Examination.** Physical examination revealed a well-developed, well-nourished white male, who looked his stated age. His height was 6 feet 1 inch; his weight, 170 lbs; temperature, 98.6°F; pulse, 98 per minute; and respirations, 20 per minute. On admission the blood pressure was 105/80 mm Hg. There was no paradoxical pulse. The pupils were equal and reacted to light. There were petechiae in both palpebral conjunctivae. The throat and neck were normal. The lungs were resonant and clear. Exam-

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\*Col. Charles L. Kirkpatrick, MC, USA, then Commanding Officer. From the Department of Medicine, Lt. Col. William G. Dunnington, MC, USA, then Chief.

\*\*Col. Joe M. Blumberg, MC, USA, Commanding Officer.

removing plantar warts and verrucae of the fingers. Anesthesia is best accomplished by means of local infiltration with procaine hydrochloride containing a vasoconstrictor.

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### ACUTE ADRENAL INSUFFICIENCY

"Acute adrenal insufficiency . . . can appear as sudden circulatory collapse, decrease in blood pressure, increase in pulse rate, or perhaps an elevation of temperature, and may cause the patient to lose consciousness quickly. In these circumstances the serum electrolytes may be normal, whilst most of the features of chronic adrenal insufficiency will be absent."

—A. G. BECKETT, B. M., M. R. C. P.  
C. J. STEVENSON, M. D., M. R. C. P.  
in the *British Medical Journal*  
p. 27, July 1956

tinal series. On 10 January he coughed up gross blood mixed with mucoid sputum. Examination of the chest at this time revealed crepitant rales throughout. The patient was digitalized with no clinical improvement. On 10 January the patient's temperature was 101°F. At this time streptomycin sulfate, 1 gram daily, and INH (brand of isoniazid), 300 mg daily, were started. The patient failed to improve. He became increasingly short of breath and continued to cough up large amounts of mucoid sputum mixed with blood. Because of progressive anemia, two blood transfusions were administered on 12 and 13 January to help replace blood loss. Dyspnea improved slightly after this. The improvement was only temporary, however, and on 20 January he required continuous oxygen and was still extremely dyspneic. After 10 January his temperature ranged from 98.6° to 100°F, occasionally going as high as 101°F. On 21 January his condition was critical. He received continuous oxygen but remained extremely dyspneic, and on 22 January he died at 0630 hours.

#### DISCUSSION

Doctor Dunnington:\* Doctor Leckert, would you present the electrocardiograms?

Doctor Leckert:\*\* The electrocardiogram on 20 December 1954 showed the auricular and ventricular rates to be 98 per minute (fig. 1). The P-R interval was 0.12 second; the QRS was 0.08 second; the Q-T interval was 0.34 second. The QRS complexes in the standard and augmented unipolar leads were low. The T waves were inverted in leads I and aVL. The T waves were low and biphasic in leads II and V<sub>3,4,5,6</sub>. The electrocardiogram of 14 January 1955 showed the auricular and ventricular rates to be 125 per minute. The P-R interval was 0.14 second; the QRS was 0.08 second; the Q-T interval was 0.30 second. There was a Q wave in leads III, aVF, and V<sub>1,2</sub>. There were low R waves in the remainder of the precordial leads. The T waves were inverted in leads I and aVL. The T waves were low and biphasic in leads II, III, aVF, and V<sub>4,5,6</sub>.

Doctor Dunnington: Doctor Zanca, would you present the x-ray findings?

Doctor Zonco:\*\*\* The first film is a transfer film taken on 16 December 1954 (fig. 2) and shows a generalized enlargement of the cardiac silhouette with bulging of the heart shadow to the right and to the left. The various arcs of the heart are obscured and obliterated. The transverse diameter of the heart measures 18.8 cm and the transverse diameter of the thorax measures 33.0 cm (about 45 per cent enlargement). The heart assumes a flask-shape configuration and suggests the pres-

\*Lt. Col. William G. Dunnington, MC, USA, then Chief, Department of Medicine.

\*\*Capt. John T. Leckert, MC, USA, Chief, Cardiovascular Service.

\*\*\*Col. Peter Zanca, MC, USA, then Chief, Radiology Service.

ination of the heart showed the apex heart to be in the sixth intercostal space at the midclavicular line; however, the area of cardiac dullness extended to the anterior axillary line in the sixth interspace. At the apex there was a continuous high-pitched rub with a musical sound in the systolic component. The first sound at the mitral area was accentuated. Examination of the abdomen revealed no palpable organs or masses. The gonitalia were normal. There was no peripheral edema.

**Laboratory Studies.** Examination of the blood on admission revealed the hemoglobin to be 16.5 g/100 ml; there were 16,350 white blood cells per  $\mu$ l, with 51 per cent neutrophils, 20 per cent lymphocytes, 3 per cent monocytes, and 26 per cent eosinophils. Bleeding time was 1 minute; coagulation time, 9 minutes; and platelet count, 228,000 per  $\mu$ l. The sedimentation rate was 18 mm per hour (corrected), and the hematocrit was 50 per cent. The cardiolipin microflocculation test was negative. The urinalysis was negative. The pericardial fluid smear showed a few neutrophils and lymphocytes. No bacteria were seen. Culture of the fluid showed no growth in 48 hours. Smear and concentrate were negative for acid-fast bacilli. Peripheral L.E. cell preparation was negative. The sputum was negative for acid-fast bacilli by smear and concentrate on four occasions. The sputum was also negative for parasites. Complete blood cell count on 13 January 1955 showed hemoglobin to be 13.2 g/100 ml; there were 12,700 white blood cells/ $\mu$ l, with 48 per cent neutrophils, 9 per cent lymphocytes, 40 per cent eosinophils, and 3 per cent basophils. Platelet count on 15 January was 190,000/ $\mu$ l. The serum calcium on 17 January was 13.5 mg/100 ml. The urinalysis showed a slight trace of albumin on 12 January but was otherwise normal. The specific gravity at that time was 1.026, and the urea nitrogen was 19.8 mg/100 ml. The serum protein on 13 January was 6.1 g/100 ml, with an albumin-globulin ratio of 2.8/3.3. PPD tuberculin tests, first and second strength, were negative.

**Course in Hospital.** When the patient was admitted to this hospital he presented the classical findings of pericardial effusion. Pericardial tap was done on 21 December 1954 and 325 ml of serosanguineous fluid were obtained. Culture of this was negative. Cell studies on the fluid for malignant cells were also negative. After the pericardial tap the shortness of breath improved. A thoracentesis was done on 30 December and 140 ml of straw-colored fluid were obtained. Subsequently a pericardial tap was done and 180 ml of serosanguineous fluid were withdrawn. The fluid again was negative for malignant cells. Two electrocardiograms were done. On 9 January 1955 the patient complained of epigastric pain. Examination of the chest at this time was normal and appointments were made for a gastro-intes-

tinal series. On 10 January he coughed up gross blood mixed with mucoid sputum. Examination of the chest at this time revealed crepitant rales throughout. The patient was digitalized with no clinical improvement. On 10 January the patient's temperature was 101°F. At this time streptomycin sulfate, 1 gram daily, and INH (brand of isoniazid), 300 mg daily, were started. The patient failed to improve. He became increasingly short of breath and continued to cough up large amounts of mucoid sputum mixed with blood. Because of progressive anemia, two blood transfusions were administered on 12 and 13 January to help replace blood loss. Dyspnea improved slightly after this. The improvement was only temporary, however, and on 20 January he required continuous oxygen and was still extremely dyspneic. After 10 January his temperature ranged from 98.6° to 100°F, occasionally going as high as 101°F. On 21 January his condition was critical. He received continuous oxygen but remained extremely dyspneic, and on 22 January he died at 0630 hours.

#### DISCUSSION

Doctor Dunnington:\* Doctor Leckert, would you present the electrocardiograms?

Doctor Leckert:\*\* The electrocardiogram on 20 December 1954 showed the auricular and ventricular rates to be 98 per minute (fig. 1). The P-R interval was 0.12 second; the QRS was 0.08 second; the Q-T interval was 0.34 second. The QRS complexes in the standard and augmented unipolar leads were low. The T waves were inverted in leads I and aVL. The T waves were low and biphasic in leads II and V<sub>3,4,5,6</sub>. The electrocardiogram of 14 January 1955 showed the auricular and ventricular rates to be 125 per minute. The P-R interval was 0.14 second; the QRS was 0.08 second; the Q-T interval was 0.30 second. There was a Q wave in leads III, aVF, and V<sub>1,2</sub>. There were low R waves in the remainder of the precordial leads. The T waves were inverted in leads I and aVL. The T waves were low and biphasic in leads II, III, aVF, and V<sub>4,5,6</sub>.

Doctor Dunnington: Doctor Zanca, would you present the x-ray findings?

Doctor Zanca:\*\*\* The first film is a transfer film taken on 16 December 1954 (fig. 2) and shows a generalized enlargement of the cardiac silhouette with bulging of the heart shadow to the right and to the left. The various arcs of the heart are obscured and obliterated. The transverse diameter of the heart measures 18.8 cm and the transverse diameter of the thorax measures 33.0 cm (about 45 per cent enlargement). The heart assumes a flask-shape configuration and suggests the pres-

\*Lt. Col. William G. Dunnington, MC, USA, then Chief, Department of Medicine.

\*\*Capt. John T. Leckert, MC, USA, Chief, Cardiovascular Service.

\*\*\*Col. Peter Zanca, MC, USA, then Chief, Radiology Service.



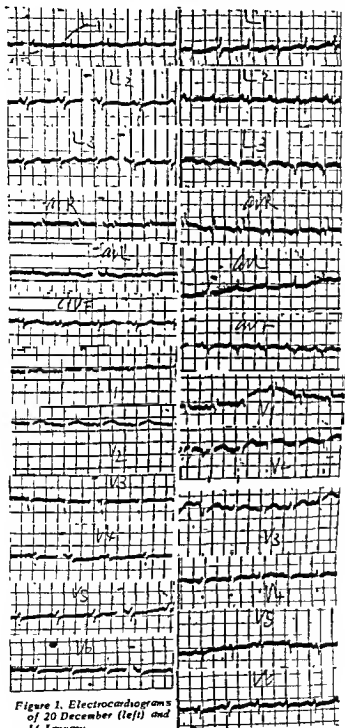
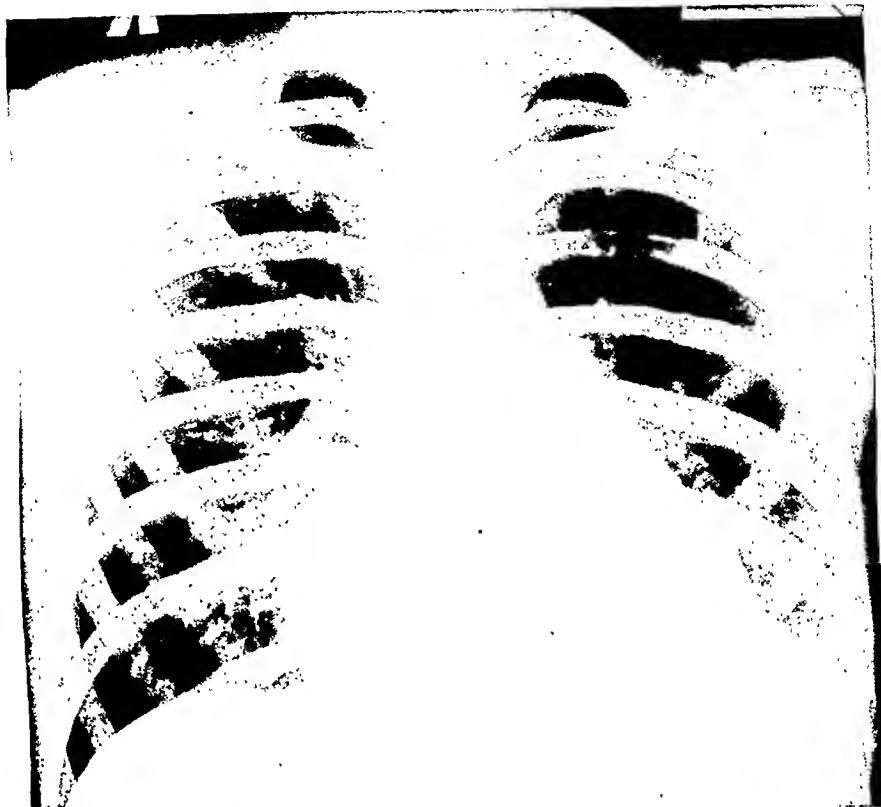


Figure 1. Electrocardiograms of 20 December (left) and 14 January.



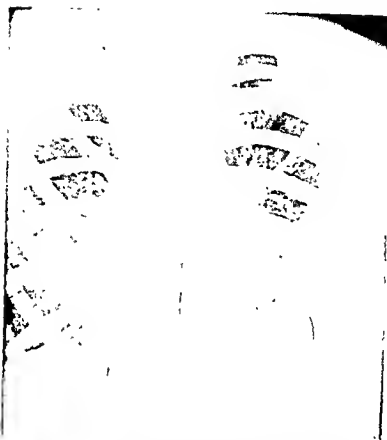
*Figure 2. Roentgenogram showing a generalized enlargement of the heart.*

ence of a massive pericardial effusion. The hilar shadows are not enlarged. There is some tenting of the dome of the left hemidiaphragm and there is an obliteration of the left costophrenic sulcus which has a concave border and suggests the presence of a small pleural effusion. The lung fields are otherwise clear. I am unable to tell whether there is any cardiac dilatation or any specific chamber enlargement.

The second and third chest films, taken on 20 and 22 December, show no change in the x-ray findings.

The fourth chest film was taken on 30 December following pericardial aspiration, and on this film (fig. 3) the transverse diameter of the heart was 15.9 cm. The pleural effusion was unchanged and the remainder of the lungs were clear.

The chest film taken on 10 January 1955 shows severe bilateral pulmonary congestion and edema (fig. 4). There is a soft, blotchy parenchymal infiltration which has a butterfly pattern. The infiltration is most dense in the inner and middle zones of the lung fields. There is still a small pleural effusion on the left. The transverse diameter of the heart now measures 17.2 cm. The roentgenologic picture at this time suggests cardiac failure with pulmonary congestion and edema.



*Figure 3. Roentgenogram of chest following pericardial aspiration.*

The last two films taken on 11 and 18 January (fig. 5) show an increase in the pulmonary congestion and edema bilaterally.

*Doctor Dunnington:* Doctor Leckert, would you begin the discussion?

*Doctor Leckert:* I am going to consider this case first in the light of the original findings and then, as I go along, try to analyze the subsequent events. The original picture is that of a 21-year-old white man with symptoms of two months' duration who presented himself with perechiae, a pericardial effusion, and eosinophilia. At this time he was afebrile. Tuberculosis, malignancy, idiopathic pericarditis, Boeck's sarcoid, disseminated lupus erythematosus, and rheumatic fever will be considered in the differential diagnosis.

Tuberculous pericarditis may arise by contiguous extension from the hilar or mediastinal nodes or from pleuropulmonary tuberculosis. This may be the result of direct contact or as the result of retrograde lymphatic extension. Occasionally, pericarditis may result from haematogenous dissemination, but here it is usually an insignificant part

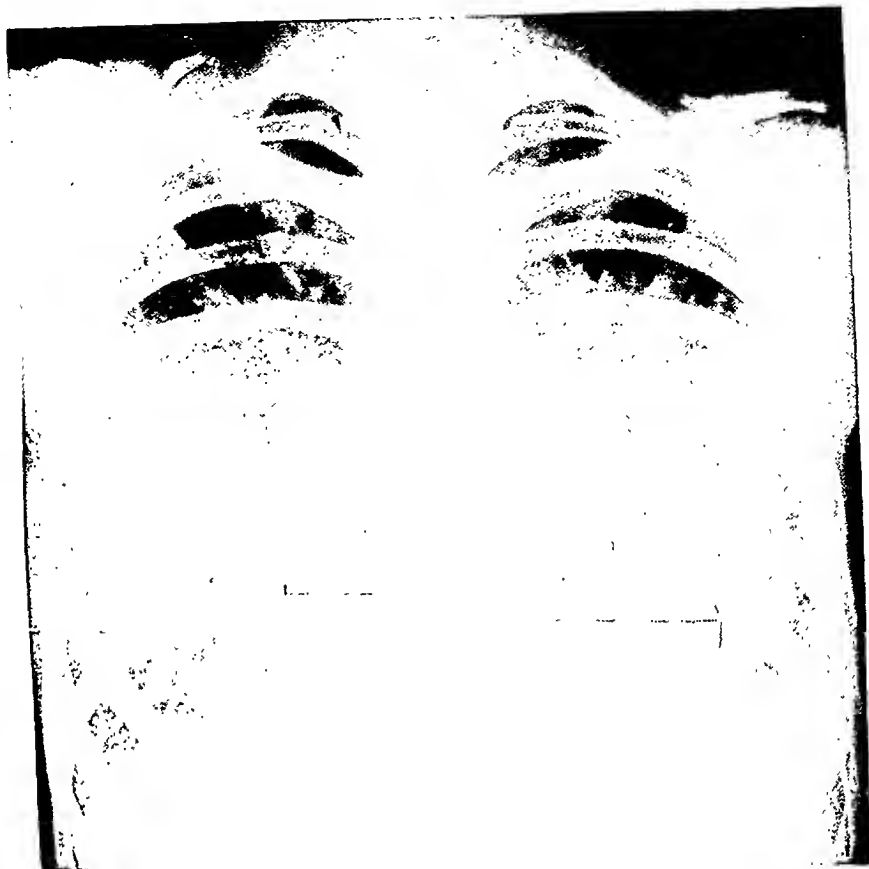


Figure 4. Roentgenogram showing bilateral pulmonary congestion and edema.

of the miliary dissemination. In this case the latter is unlikely because initially the patient was afebrile. Eosinophilia is usually not associated with tuberculosis. However, Wintrobe<sup>1</sup> states that extensive caseous tuberculosis of the lymph nodes can be accompanied by eosinophilia. In this patient the PPD tuberculin test was consistently negative. Amberson<sup>2</sup> mentions five situations that may cause the tuberculin reaction to be depressed or absent. The lesions may be thoroughly healed and calcified. The dose of tuberculin may be too small. A false negative reaction can occur in the presence of severe measles or influenza. The test may be negative in the latter months of pregnancy, or in an occasional terminal case. Of these, only the last is applicable in our patient.

The second possibility that might explain the initial picture is a primary or metastatic malignant process involving the pericardium. The most common of the metastatic tumors involving the heart arise from the bronchi, lungs, and breast.<sup>3</sup> Many other primary sites have been reported. The fluid is frequently serosanguineous and malignant cells

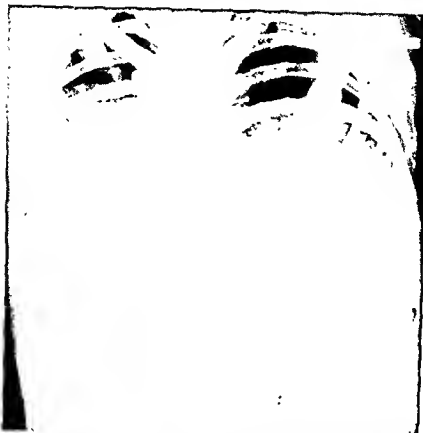


Figure 5. Roentgenogram showing increase in pulmonary congestion and edema.

have been isolated in pericardial taps. In this patient the pericardial fluid was negative for malignant cells. Primary sarcomas may arise from the heart or pericardium. Frequently there are localized bulges of the cardiac silhouette on roentgenograms of the chest. Isaacs and Rapoport<sup>4</sup> reviewed the literature and reported 15 cases of their own of eosinophilia in patients with malignant tumors. They concluded that it is indicative of dissemination of the malignant process.

Goyette<sup>5</sup> has reported 28 patients with acute benign pericarditis. Four of these presented pericardial effusion. Sixteen showed an elevation of the white blood cell count above 10,000/ $\mu$ l. Eosinophilia is not mentioned. Some of the original picture in this case could certainly be explained by idiopathic pericarditis. However, the subsequent course makes this diagnosis untenable.

Boeck's sarcoid may cause pericardial involvement. It would also explain the negative tuberculin tests and the elevated serum calcium. Eosinophilia up to 35 per cent has also been reported in sarcoidosis.<sup>6</sup>

Disseminated lupus erythematosus is a common cause of pericardial effusion. However, this patient is male. There are no signs of skin, joint, or renal involvement. There is a leukocytosis rather than the typical leukopenia, and the L.E. cell preparation is negative.

Rheumatic fever may cause pericardial effusion. However, this is usually associated with some other manifestation of rheumatic fever.

On 10 January the patient coughed up gross blood with mucoid sputum. Examination of the chest revealed crepitant rales throughout. A roentgenogram of the chest showed a soft, mottled infiltration throughout both lungs. Previous films had only demonstrated the pericardial effusion. This most probably represents a further dissemination of the original process. Three possibilities stand out at this time: tuberculosis, Boeck's sarcoid, and malignancy.

Tuberculosis could easily explain most of this picture, except that with pulmonary dissemination one would expect more fever and there should have been some response to streptomycin sulfate and INH. The tuberculin test was negative, but in the occasional terminal case this may be true. Petechiae are not a manifestation of tuberculosis.

Boeck's sarcoid could possibly produce the pulmonary lesions. However, the exodus seems too fast for this disease. The pulmonary process in sarcoidosis<sup>7,8</sup> presents a more chronic course.

With the pulmonary spread one naturally wonders about a malignant process and we cannot forget the lymphomas, because they may present a similar picture.

Rheumatic fever is occasionally associated with a rheumatic pneumonia, but of the six fatal cases reported by Seldin and associates<sup>9</sup> all showed evidence of valvular heart disease.

One might conclude that this patient had originally an idiopathic pericarditis with a superimposed pneumonia. However, this would not explain the eosinophilia and petechiae. In addition, the febrile response was quite low for an ordinary pneumonia.

Ziek<sup>10</sup> has applied the term necrotizing angiitis to a group of vascular lesions characterized in their fully developed stage by inflammatory reaction and fibrinoid necrosis. Under this group she lists five entities:

1. *Periarteritis nodosa*: This is a recurrent, progressive, necrotizing, inflammatory lesion of the muscular-type arteries. It has predilection<sup>11</sup> for the gastro-intestinal tract, kidneys, striated muscles, and near peripheral nerves.

2. *Temporal arteritis*:<sup>12</sup> This involves temporal and other cranial arteries.

3. Rheumatic arteritis: This is associated with a fulminating type of rheumatic carditis with arterial lesions of the heart and lungs. Occasionally it may be widely disseminated.

4. Hypersensitivity angitis: In these cases the illness lasts a few days to one month with involvement of the arterioles, venules, capillaries, and small arteries. It has predilection for the kidneys and heart; often the lungs and spleen are involved. It is unknown in the gastrointestinal tract.

5. Allergic granulomatous angitis: Churg and Strauss<sup>14</sup> described 13 cases of this entity. Five cases demonstrated pericarditis, two of which were in an acute fibrinous stage. It is frequently associated with asthma or other allergic states. The duration of the illness is several months to several years. There is involvement of any size vessel, especially small arteries and veins. Grossly, nodules may be related to small vessels. However, the most characteristic lesions are noted microscopically in the intrinsic vessels of the viscera, most predominantly the heart and lungs. The small nodules are made up of numerous eosinophils undergoing necrosis, severe fibrinoid change in the connective tissue, and granulomatous proliferation of the epithelioid and giant cells.

It is my impression that this patient falls into the occluding angitis group and of the described entities his symptoms more closely resemble allergic granulomatous angitis. This could explain the pericarditis, pericarditis, eosinophilia, and pulmonary lesions.

Doctor Dunnington: Doctor Zanca, would you discuss the x-ray findings?

Doctor Zanca: From the first film all that can definitely be said is that there is a massive pericardial effusion and a small pleural effusion on the left side. With regard to the pericardial effusion: (1) Acute pericardial effusions are usually the result of suppurative infection, rupture of an aneurysm, or rupture of a malignant tumor into the pericardium. I am unable to exclude this possibility. (2) A subacute pericardial effusion may be secondary to rheumatic heart disease (I am unable to rule out this possibility at this time), toxemia, or severe anemias. (3) A chronic pericardial effusion may result from tuberculosis, myxedema, or hypoproteinemia. As for the pleural effusion seen on the left side, this condition (1) may be secondary to an inflammatory process, such as pyogenic infection or tuberculosis, (2) may represent a transudate as a result of vascular and lymphatic engorgement, (3) may be secondary to a primary or metastatic malignant tumor, or (4) may even be secondary to pulmonary infarct or embolism.

Doctor Dunnington: Can the cardiac shadow represent any other disease condition besides pericardial effusion?

Doctor Zanca: Yes, in generalized cardiac enlargement the contour and configuration of the heart may be exactly the same as in massive pericardial effusion. I will list and rule out some of the more common

causes of generalized cardiac enlargement which might simulate massive pericardial effusion: (1) various congenital heart conditions (to name one, atrial septal defect with rheumatic mitral regurgitation); (2) chronic severe anemias; (3) hyperthyroidism; (4) myxedema; (5) myocarditis, secondary to diphtheria, scarlet fever, or pneumonia (rheumatic myocarditis can give this picture and cannot definitely be ruled out); (6) toxic lesions of the heart, such as drug poisoning; and (7) coronary sclerosis or thrombosis. This last is the most likely picture in this case, especially since there is an associated left pleural effusion. In 60 per cent of all myocardial infarctions there is an associated left pleural effusion or hydrothorax.

In the second phase of the patient's illness the differential diagnosis should include all of the conditions which can cause cardiac failure. Here we can rule out: (1) cardiorenal disease (no evidence of nephritis); (2) hypertensive heart disease (as the cardiac configuration did not conform with the characteristic hypertensive aortic and ventricular pattern); (3) decompensated cor pulmonale (no associated underlying pulmonary changes); and (4) rheumatic heart disease (as in addition to the hydrothorax one would expect pulmonary infarcts). I am unable to exclude the possibility of idiopathic pericarditis. The most likely diagnosis is coronary thrombosis or sclerosis, since an associated left-sided pleural effusion is frequently found in myocardial infarction.

**Doctor Dunnington:** Doctor Leckert, are the electrocardiographic findings compatible with a myocardial infarction?

**Doctor Leckert:** The electrocardiogram of 20 December 1954 with inverted T waves in Leads I and aVL with low T waves in the precordial leads is abnormal and compatible with pericarditis or myocardial disease. The second, on 14 January 1955, in addition shows a Q wave in Leads III and aVF. This tracing is compatible with a posterior myocardial infarction. However, inspiratory leads were not taken and it is conceivable that these Q waves could be due to heart position. The second electrocardiogram also shows Q waves in  $V_{1,2}$  with low R waves in the remainder of the precordial leads. These findings could be explained by an antero-septal myocardial infarction.

**Doctor Dunnington:** Doctor Buchanan, would you discuss the case?

**Doctor Buchanan:**\* I would agree with the principal discussor, Doctor Leckert, that the most likely diagnosis is necrotizing angitis. However, I do believe that the various parasitic diseases which are common in the Far East should be considered. This individual had a pleuro-pericardial effusion, pulmonary infiltration, and marked eosinophilia. There are three prominent parasites which can give a picture resembling this. Most common in Korea, among the local population is *Paragonimus westermani*. The parasite, in boring through the diaphragm and into the lungs, may burrow into the pericardium and myocardium as well

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\*Maj. David P. Buchanan, MC, USA, Chief, Gastroenterology Service.



as involve the pleura and lungs. It can give a pulmonary disease accompanied by eosinophilia and the production of copious mucoid, hemorrhagic sputum. In the disease the ova of *Paragonimus* are easily demonstrable in the sputum and I believe that this diagnosis would not be renable here.

Nematodes, primarily *Strongyloides*, as part of their migration into the body, burrow into and under the bronchial mucosa and can cause pericarditis and bronchitis, as well as changing pulmonary infiltrations and eosinophilia. I believe that of the parasitic diseases, *Strongyloides* infestation is the most likely.

Hookworm disease can cause a similar syndrome, but this parasite can more easily be found in the feces.

Doctor Dunnington: What studies were made to rule out parasitism?

Doctor Leckert: The stool and sputum examinations were negative for ova and parasites.

Doctor Dunnington: Doctor Chandler, would you care to add anything to the discussion?

Doctor Chandler:\* In reviewing this patient's course, I believe that periarteritis nodosa should be rather strongly considered. The patient had a persistent eosinophilia and involvement of two serous surfaces, the pericardium and pleura. There was a reversal of the albumin-globulin ratio. I feel that the changes that occur in the vessels of the heart in this disease could account for the subsequent marked enlargement and the failure that the patient had. Against this diagnosis is the fact that the urinalysis, except for a slight trace of albumin on admission, was completely negative. In addition there was neither hematuria nor hypertension. However, since in this case the clinical course is not typical of any disease that I can think of, I would like to cast my vote for periarteritis nodosa.

Dr. Leckert's diagnosis:

Allergic granulomatous angitis

Dr. Zanca's diagnosis:

Coronary thrombosis or sclerosis

Dr. Buchanan's diagnosis:

Necrotizing angitis

Dr. Chandler's diagnosis:

Periarteritis nodosa

Doctor Dunnington: Doctor Blumberg and Doctor Tsumagari, would you present the autopsy findings?

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\*Maj. Bruce F. Chandler, MC, USA, Chief, Medical Consultation Service.

## PATHOLOGIC FINDINGS

**Doctor Tsumagari:**\* At autopsy the pathologic findings were confined largely to the heart, lungs, and left kidney. On opening the body the heart was enlarged. It weighed 400 grams; the pericardial space was obliterated by adhesions. On opening the heart we found that all walls showed multiple areas of infarction of varying ages consistent with the clinical course. Both ventricles were slightly enlarged. Within all chambers, there were firmly attached mural thrombi. None of the coronary arteries showed evidence of thrombi grossly. The ostium of the right posterior descending coronary artery was less than 1 mm in diameter. When this vessel was dissected there was found a post-stial dilatation. Microscopic examination of the larger coronary vessels showed varying degrees of intimal thickening. The smaller vessels, however, presented occlusive thrombi with increased amounts of sclerosis.

The lungs were two and a half times heavier than normal. All lobes showed areas of recent hemorrhagic infarctions. The examination of the pulmonary arteries disclosed occlusive thrombi. There was a generalized thickening of the interstitial tissue and evidence of long-standing congestion.

In the left kidney there was an area of ischemic infarction as evidence of thrombo-embolic phenomena. In addition there was microscopic evidence of thrombo-embolic phenomena in the brain. The liver showed anoxic changes around the central veins which were associated with the congestive failure.

**Doctor Blumberg:** This case is presented because of an unusual clinical expression of heart disease in a young man that was unrecognized as such during his life due to an absence of precordial pain, presenting signs of pericardial effusion, and failure to recognize the importance of the electrocardiogram. In the localization of the distribution of occlusion of coronary arteries 68 per cent showed occlusion in the first 3 cm of the coronary vessels.<sup>14</sup> In this case the right coronary ostium was almost completely occluded, but without thrombus. The case is interesting, in that the disease in the patient's coronary vessels involved the smaller branches at many points rather than one large single thrombus. Why he did not have precordial pain is not known; however, in this case his pain seemed to be confined to the epigastrium. It is felt by some that an accumulation of metabolites in the myocardium combined with inadequate circulation is the cause of pain in coronary disease. Within a period of weeks the patient presented many small focal lesions which involved only small areas of the myocardium at a time. This may account for the lack of sharp precordial pain. There was no evidence of old scars to indicate that these episodes had occurred earlier. We must be aware that this is a disease of young people, the incidence

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\*Capt. Yukio Tsumagari, MC, USA, Pathologist, 406th Medical General Laboratory.

being 0.1 per 100,000 population between the ages of 18 and 19 with a gradual rise to ages 35 to 39 of 12 per 100,000 men per year. All other changes found at autopsy were related to the primary disease affecting the coronary vessels which followed a natural history of mural thrombi, emboli, infarction, chronic passive congestion, heart failure, and death.

### Pathologic diagnosis:

### Coronary thrombosis with myocardial infarction

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*The specialist is too commonly hypertrophied in one direction and atrophied in all the rest.*—Martin T. Fischer

more years old. Accordingly tests were also conducted, using both old and freshly prepared pyrethrum louse powders, to establish the effectiveness of this old stock of materials should it become necessary to use them.

Although no definite figures on the use of DDT in either West or East Germany are available, events in the immediate past history of the two areas would lead to the supposition that DDT has been used far more extensively in West Germany than in East Germany. For example, one Army unit alone, in 1944 and 1945, used over 37 tons of 10 per cent DDT powder for the mass delousing of over 2,000,000 persons.<sup>4</sup> In more recent years, DDT has been used extensively, both by the military services and within the West German economy, for a wide variety of insect-control problems. For example, the Federal Minister of West Germany for Food, Agriculture, and Forestry reported<sup>5</sup> that in 1952 nearly a million pounds of 100 per cent DDT was used in various formulations in agricultural and forestry activities.

The nature of the economy in East Germany on the other hand, coupled with such vague reports as those concerning the losses being caused by the Colorado potato beetle, an insect readily controlled with DDT, would indicate that the use of DDT in that area is extremely limited. Since in many instances DDT susceptibility appears to be inversely related to the extent and intensity of use of DDT, body louse strains from two areas differing in their past history of the use of this insecticide might differ in their susceptibility to DDT. Accordingly, tests were also conducted to compare the effectiveness of DDT and pyrethrum for the control of East German and West German strains of body lice.

#### EXPERIMENTAL PROCEDURE

The strains of body lice and the rearing methods used for these tests have been previously described,<sup>4</sup> the lice having been obtained from vagrants in the Frankfurt City Jail and a refugon from East Germany. Rearing methods were unchanged except that the lice were fed by placing them upon the exposed back of a volunteer lying face down on a laboratory table. This slight modification of the feeding procedure allowed more lice to be fed at one time in a manner that would ensure that the strains would remain segregated.

The testing procedure employed differs markedly from that previously used and is based upon a testing protocol<sup>4</sup> developed by the Orlando Laboratory. This provides for exposing lice for 24 hours on 4.9-inch square patches of balbriggan cloth treated with 0.5 gram of various dilutions of DDT and pyrethrum louse powders. This rate of application is equivalent to about 2¼ ounces of dust per uniform. The lice were confined on the cloth

under weighted Petri dishes and placed in an incubator maintained at 85°F and 60 per cent relative humidity. At the end of this period results were evaluated in terms of living, moribund, and dead lice. Living lice were regarded as those capable of normal co-ordinated walking movements, moribund lice as those showing un-co-ordinated movement, and dead lice as those showing no movement when prodded with a needle.

### TOXICOLOGIC TESTS

**Susceptibility of West German Strains of Body Lice to DDT.** A series of tests were conducted in which West German strains of body lice were exposed to various concentrations of DDT powder at the rate of 21 mg of dust per square inch of treated surface, a single test employing 10 male and 10 female lice.

The results of these tests, together with results previously obtained at this laboratory, are summarized in table 1. Appreciable numbers of lice survived exposures to 0.1, 0.5, and 1.0 per cent DDT powders, concentrations that would be expected to give fairly consistent 100 per cent kills of the U. S. strain in 24 hours.

TABLE 1. *Mortality of West German strains of body lice exposed for 24 hours to various concentrations of DDT powder*

Concentration of DDT (per cent)	Mg per sq in.		Total no. of lice	Percentage of lice		
	Dust	DDT		Alive	Moribund	Dead
Control	---	---	200	100	0	0
0.1	21	0.02	80	12.5	18.8	68.7
0.5	21	0.11	200	12.0	9.0	79.0
1.0	21	0.21	200	4.0	7.5	88.5
5.0	21	1.05	80	0	2.5	97.5
Bunn <sup>4</sup>						
10.0	13	1.30	500	3.6	5.6	90.8
10.0	27	2.70	400	0.7	5.5	93.8

**Effectiveness of 11-year-old Pyrethrum Louse Powder Formulations.** The effectiveness of freshly prepared pyrethrum louse powders furnished by the Orlando Laboratory was compared with that of samples of pyrethrum louse powder taken from stocks in this command, which was procured early in World War II and had the following composition: 0.2 per cent pyrethrins (1 per cent of a 20 per cent pyrethrum extract); 2.0 per cent 2,4-dinitroanisole; 2.0 per cent N-isobutyl undecylenamide; 0.25 per cent Phenol S; and 94.75 per cent Pyrax.

Since freshly prepared formulations of this potency can be expected to give 100 per cent kills in 24 hours, both freshly prepared and old powders were diluted 1:4 and 1:9 with Pyrax to give pyrethrins concentrations of 0.04 per cent and 0.02 per cent, respectively. Using 0.5 gram of these two dilutions of the old louse powders per patch, 100 per cent kills in 24 hours were obtained (table 2). Accordingly, an additional series of tests were run using only 0.1 gram of the diluted powders per patch. Very low kills were obtained with these reduced rates of application, but the freshly prepared powder, containing 0.04 per cent pyrethrins, applied at the rate of 4.2 mg per square inch, affected or killed 80 per cent of the lice, whereas the 11-year-old powder at the same dilution and rate of application affected or killed only 14 per cent (table 2).

TABLE 2. Mortality of West German strains of body lice exposed for 24 hours to various dilutions of freshly prepared and 11-year-old pyrethrum louse powders

Type of formulation	Per cent pyrethrins	Mg per sq in.		Total no. of lice	Percentage of lice		
		Dust	Pyrethrins		Alive	Moribund	Dead
Fresh	0.02	4.2	.0008	80	86	5	9
Fresh	0.04	4.2	.0017	80	20	66	14
Old	0.02	4.2	.0008	320	91	5	4
Old	0.04	4.2	.0017	320	86	9	5
Pyrax	0.00	4.2	.0000	80	96	0	4
Control	0.00	0.0	.0000	40	95	2.5	2.5
Old	0.02	21.0	.0042	420	0	0	100
Old	0.04	21.0	.0084	420	0	0	100
Pyrax	0.00	21.0	.0000	120	87	6.5	6.5
Control	0.00	0.0	.0000	120	100	0	0

Comparative Effectiveness on East and West German Strains of Body Lice of DDT and Pyrethrum Louse Powders. Males and females of the Frankfurt and Berlin louse strains were exposed in lots of 20 to various DDT and pyrethrum louse powders for 24-hour periods. The results, as summarized in table 3, show that all lice reacted to pyrethrins in about the same manner regardless of strain or sex, but that the West German (Frankfurt) strain did not appear to be as susceptible to DDT as was the East German (Berlin) strain.

TABLE 3. Mortality of East and West German strains of body lice exposed for 24 hours to various concentrations of DDT and pyrethrum touse powders applied to test patches at the rate of 21 mg per square inch

Insecticide formulation	Frankfurt strain				Berlin strain			
	Total number of lice	Percentage of lice			Total number of lice	Percentage of lice		
		Alive	Moribund	Dead		Alive	Moribund	Dead
<i>Males</i>								
0.1% DDT	60	47	25	28	60	5	10	85
0.5% DDT	60	2	13	85	60	0	0	100
1.0% DDT	60	15	17	68	60	0	0	100
5.0% DDT	20	0	0	100	60	0	0	100
0.02% pyrethrins	60	3	48	49	60	3	25	72
0.04% pyrethrins	20	0	5	95	60	0	0	100
Untreated control	60	100	0	0	60	100	0	0
<i>Females</i>								
0.1% DDT	60	62	22	16	60	20	7	73
0.5% DDT	60	15	12	73	60	0	2	98
1.0% DDT	60	23	27	50	60	0	2	98
5.0% DDT	20	0	10	90	60	0	2	98
0.02% pyrethrins	60	0	58	42	60	0	35	65
0.04% pyrethrins	20	0	0	100	60	0	5	95
Untreated control	60	100	0	0	60	100	0	0

## DISCUSSION

The results obtained by exposing West German strains of body lice to various concentrations of DDT confirm the results previously obtained at this laboratory,\* from which it was concluded that 10 per cent DDT louse powder could still be expected to achieve satisfactory body louse control in West Germany. A further supposition raised by the previous work, to the effect that European strains might be slightly more resistant to DDT than are the strains maintained in the United States, is confirmed by the recent tests, since consistent 100 per cent kills were not obtained with 0.1 per cent DDT powder. In the third series of tests (table 3), even lower kills were obtained with the Frankfurt strain than were obtained in the tests summarized in table 1.

In tests to determine the relative effectiveness of freshly prepared and 11-year-old pyrethrum louse powders, 100 per cent kills were obtained with the diluted 11-year-old material, and although there was indication that this old material had lost some of its potency, the loss was not appreciable. All tests *resulting in less than 100 per cent mortality involved the use of diluted powders at rates of application far below the recommended rate.*

A comparison of the results obtained with East and West German strains of body lice indicates that the West German strain is slightly less susceptible than the East German strain to DDT, but that the two strains are equally susceptible to pyrethrins. This finding is in agreement with that of other workers,<sup>1</sup> who report that DDT-resistant strains of body lice in Korea appear to be about as susceptible to pyrethrum louse powders as are the DDT-susceptible strains maintained in the United States.

## SUMMARY

Strains of West German and East German body lice were evaluated for their susceptibility to DDT and to pyrethrum louse powders. While a minor difference was found in the susceptibility of the two strains, the West German strain exhibiting a slight resistance to DDT, both strains can be adequately controlled with either 10 per cent DDT powder or pyrethrum powder. *Eleven-year-old stocks* of pyrethrum louse powders were found to be completely effective.

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### SLOW PROGRESS

The scientist must be constantly engaged in the acquisition of two mental characteristics, objectivity and tolerance. He who attempts to cultivate an attitude in which these elements predominate is likely to experience much discouragement when he realizes how slowly a gradual approximation to this state progresses. He may, however, take heart from a consideration of the fact that it is a recognized characteristic of living organisms that changes in a particular direction are often slow in manifesting themselves. Even a simple microbial adaptation may involve periods of time considerably in excess of the generation time of the organism, and a truly significant advance in scientific understanding is an event of rare enough occurrence in spite of the vast amount of time that a large number of scientists devotes to increasing our knowledge.

—C. B. VAN NIEL  
in *Bacteriological Reviews*  
pp. 4-5, Mar. 1955



military-owned vehicles, data have been collected from death certificates and investigation reports covering all deaths of Navy and Marine Corps personnel in accidents involving government-owned ground vehicles during the period 1952 through 1954. Table 1 shows an analysis of these deaths, classified as to type of vehicle, whether or not rollover occurred, and whether or not the victim was thrown clear.

Two broad types of vehicles are involved, open-top and hard-top. In those accidents involving open-top vehicles rolling over, it seems unlikely that the number killed would have been reduced if seat belts had been worn; rather, it seems probable that they would have been increased. On the other hand, table 1 shows a number of deaths in which the use of seat belts would have greatly improved the chance of survival. These include most if not all of the fatalities in hard-top vehicles where the victim was thrown out of the vehicle, with or without rollover. Passengers in the hard-top vehicles who were not ejected usually suffered only slight injuries.

The period covered includes the Korean conflict, which explains the high percentage of the deaths (41 out of 72) that occurred in connection with jeeps, weapons carriers, heavy trucks, and one DUKW (duck). In normal peacetime, deaths in these military-type vehicles would be a smaller proportion of the total. Twenty of the 41 occurred in Korea, 12 elsewhere outside the United States (mainly Japan and Puerto Rico), and 9 within the United States. These open-top vehicles rolled over in 33 out of 38 deaths in which the vehicle was involved in an accident. In five deaths the vehicle was damaged but did not roll over, and in three cases, a passenger fell off and was killed without an accident to the vehicle.

Considering that in all "rollover" deaths from trucks and in half of those from jeeps and weapons carriers the victims were pinned down or rolled on by the vehicle, the assumption seems confirmed that no reductions and perhaps increases in death rates would occur if seat belts were installed in such vehicles. This is based on the fact that only eight deaths conceivably might have been prevented, *i. e.*, five where the vehicles were in accidents and did not roll over, and three where a passenger fell off a heavy truck that was not in an accident. These three would definitely have been saved by seat belts, although belts would not have been easy to apply to passengers seated, as they were, in the back of heavy trucks. Contrasted with this are 10 persons involved in the rollover accidents who escaped death by being thrown out. These 10 presumably would have died, if they had been tied down by seat belts. Of the 33 deaths where the vehicle rolled over, almost all involved a crushing injury, the victim being pinned down or rolled on. It is assumed that

# ACCIDENTAL DEATHS IN MILITARY VEHICLES

## In Relation to the Use of Seat Belts

ROBERT W. BABIONE, *Captain, MC, USN*

**T**HE ENORMOUS cost in both manpower and money of injuries and deaths caused by motor vehicle accidents is receiving increasing attention in the military services. Badwell<sup>1</sup> analyzed data on accidental trauma in the Armed Forces and found that in 1953 over 22,000 injuries to personnel resulted from accidents involving ground motor vehicles. McFarland<sup>2</sup> reported that each year about 2,100 servicemen are killed in automotive accidents. The Air Force estimated that one fatality costs the government \$31,500, and each total disability \$63,500. Wenger<sup>3</sup> pointed out the advantages of several safety devices in automobiles, naming the use of seat belts as "the first, simplest, and perhaps under present circumstances, the most effective procedure."

Studies made by Moore and Tourin<sup>4</sup> under the sponsorship of the Commission on Accidental Trauma of the Armed Forces Epidemiological Board indicated that in an automobile accident, being thrown from the vehicle greatly increases the probability of serious injury and the risk of being killed. Their evidence led to a recommendation by the Board in May 1955 that seat belts be installed in military ground vehicles. It was expected that this would result in a direct reduction in injuries and an indirect improvement through inspiring military personnel to use seat belts in their privately owned vehicles.

In regard to open-top vehicles (jeeps, personnel and weapons carriers, trucks without cab, or cetera), considerable doubt exists as to the relative hazard of seat belts—whether it is better or worse to be strapped to the seat in event of an accident. This depends on the proportion of accidents in which the vehicle rolls over. Data limited to deaths alone can provide only a partial answer, because conceivably, non-rollover accidents may cause many serious but relatively few fatal injuries preventable by the use of seat belts, while in rollovers of open-top vehicles, being thrown clear may often prevent more serious injury.

In order to estimate the limits of possible benefits in respect to mortality that might accrue if seat belts were installed in

*From Armed Forces Epidemiology Board, Washington 25, D. C.*